M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
Approved by AICTE & Affiliated to Anna University
ISO 9001:2015 Certified Institution
Thalavapalayam, Karur, Tamilnadu.

B.E

COMPUTER SCIENCE AND ENGINEERING

REGULATION 2018

CURRICULUM AND SYLLABUS

CURRICULUM AND SYLLABUS

REGULATION 2018

Programme: B.E. – Computer Science and Engineering

Vision of the Department:

To achieve education and research excellence in computer Science and Engineering

Mission of the Department:

M1: To excel in academic through effective teaching learning techniques.

M2: To promote research in the area of computer science and engineering with the focus on innovation.

M3: To transform students into technically competent professionals with societal and ethical responsibilities.

Programme Educational Objectives (PEOs):

PEO1: Graduates will have successful career in software industries and R&D divisions through continuous learning.

PEO2: Graduates will provide effective solutions for real world problems in the key domain of computer science and engineering and engage in lifelong learning.

PEO3: Graduates will excel in their profession by being ethically and socially responsible.

Mapping of Programme Educational Objectives with Mission of the Department:

Department Mission Statements / PEOs	M1	M2	M3
PEO1	3	3	2
PEO2	3	3	2
PEO3	2	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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Programme Outcomes (POs):

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs):

PSO1: Professional Skills: Ability to apply the knowledge of computing techniques to design and develop computerized solutions for the problems.

PSO2: Successful career: Ability to utilize the computing skills and ethical values in creating a successful career.

Mapping of Programme Educational Objectives with Programme Outcomes and Programme Specific Outcomes:

POs & PSOs / PEOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
PEO2	3	3	3	3	3	3	3	2	-	-	2	3	3	3
PEO3	-	-	-	-	-	3	3	3	3	-	-	-	-	3

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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Programme Articulation

Semester	Course Code	Course Name	POs												PSOs	
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	18LEH101J	Technical English	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	-
1/2	18MBH102L	General Aptitude	✓	✓	-	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓
1/2	18CYB101J	Chemistry	✓	✓	-	✓	-	-	-	-	-	-	-	-	-	-
1	18MAB101T	Calculus and Linear Algebra	✓	✓	✓	✓	✓	-	-	-	✓	-	-	✓	✓	✓
1/2	18MES101J	Engineering Graphics	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	-	✓	✓	✓
1/2	18EES101J	Basic Electrical and Electronics Engineering	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	-	✓	✓	✓
1	18LEM101T	Constitution of India	-	-	-	-	-	-	✓	✓	✓	✓	✓	✓	-	-
2	18LEH102J	Professional English	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓
1/2	18MBH101L	Professional Skills and Practices	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	-	✓
1/2	18GNM102L	Physical and Mental Health using Yoga	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-
1/2	18PYB101J	Physics	✓	✓	✓	✓	-	-	-	-	-	-	-	-	✓	✓
2	18MAB102T	Advanced Calculus and Complex Analysis	✓	✓	✓	✓	✓	-	-	-	✓	-	-	✓	✓	✓
1/2	18CSS101J	Programming for Problem Solving	✓	✓	-	-	-	-	-	-	✓	✓	-	✓	✓	✓
1/2	18MES102J	Basic Civil and Mechanical Engineering	✓	-	✓	-	✓	✓	✓	-	✓	-	-	✓	-	-
2	18LEM102T	Value Education	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	-	✓	-	✓
3	18MAB203T	Probability Statistics and Queuing Theory	✓	✓	✓	✓	-	-	-	-	-	-	-	-	✓	✓
3	18ECS202J	Analog and Digital Electronics	✓	✓	✓	✓	✓	✓	-	-	✓	✓	-	✓	✓	✓
3	18CSC201J	Data Structures and Algorithms	✓	✓	✓	✓	✓	-	-	-	✓	✓	-	-	✓	✓
3	18CSC202J	Object Oriented Programming	✓	✓	-	-	✓	-	-	-	✓	✓	-	-	✓	✓
3	18CSC203T	Operating Systems	✓	✓	✓	✓	-	-	-	-	✓	✓	-	✓	✓	✓
3	18CSC204T	Computer Architecture and Organization	✓	✓	-	-	-	-	-	-	✓	✓	-	-	✓	✓
3	18CSP201L	Minor Project - I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	18MBM201L	Comptencies in Social Skills	✓	-	-	-	-	-	-	-	✓	✓	-	-	✓	✓
3/4	18CYM201T	Environmental Science	-	✓	-	✓	-	✓	✓	✓	-	-	-	-	-	-
4	18MAB206T	Discrete Mathematics	✓	✓	✓	✓	-	-	-	-	-	-	-	-	✓	✓

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Semester	Course Code	Course Name	POs												PSOs	
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
4	18ECS203J	Microprocessor and Microcontroller	✓	✓	✓	✓	✓	-	-	-	✓	✓	-	-	✓	✓
4	18CSC205J	Database Management Systems	✓	✓	✓	-	✓	-	-	-	✓	✓	-	-	✓	✓
4	18CSC206J	Computer Networks	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓
4	18CSC207T	Design and Analysis of Algorithms	✓	✓	-	-	-	-	-	-	✓	✓	-	-	✓	✓
4	18CSC208T	Human Computer Interaction	✓	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	✓
4	18CSP202L	Minor Project - II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	18MBM202L	Critical and Creative Thinking Skills	✓	-	-	-	-	-	-	-	-	✓	-	-	✓	✓
3/4	18LEM103T	Indian Tradition and Heritage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
5	18CSC301J	Machine Learning	✓	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	✓
5	18CSC302T	Compiler Design	✓	✓	✓	✓	-	-	-	-	✓	✓	-	-	✓	✓
5	18CSP301L	Minor Project - III	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	18MBM301L	Analytical and Logical Thinking Skills	✓	-	-	-	-	-	-	-	✓	✓	-	-	✓	✓
5/6	18LEM301T	Indian Art Forms	-	-	-	-	-	✓	✓	✓	✓	✓	-	✓	-	✓
6	18MBH201T	Management Principles for Engineers	✓	✓	-	-	-	✓	-	-	✓	✓	✓	✓	✓	✓
6	18CSC303J	Web Programming	✓	✓	✓	-	-	-	-	-	✓	-	-	-	✓	✓
6	18CSC304J	Big Data and Analytics	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
6	18CSP302L	Minor Project - IV	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	18MBM302L	Employability Skills and Practices	✓	-	-	-	-	-	-	-	✓	✓	-	-	✓	✓
5/6	18LEM302T	Self Development and Entrepreneurship	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	18MBH202T	Social Engineering	✓	✓	-	-	-	✓	✓	✓	✓	✓	-	✓	✓	✓
8	18CSP401L	Project Work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	18CSE001T	Adhoc and Sensor Networks	✓	✓	✓	-	-	-	-	✓	✓	✓	-	✓	✓	✓
-	18CSE002T	Agile Methodology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	18CSE003T	Artificial Intelligence and Robotics	✓	✓	✓	✓	-	-	-	-	✓	✓	-	✓	✓	✓
-	18CSE004T	Bioinformatics	✓	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓	✓
-	18CSE005T	Blockchain	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	✓	✓
-	18CSE006T	Building Enterprise Applications	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓

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Semester	Course Code	Course Name	POs												PSOs	
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
-	18CSE007T	Computer Vision	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
-	18CSE008T	Cryptography and Network Security	✓	✓	✓	-	-	-	-	✓	✓	✓	-	✓	✓	✓
-	18CSE009T	Cyber Forensics	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	✓	✓
-	18CSE010J	Data Science	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	18CSE011T	Data Warehousing and Data Mining	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	-	✓	✓	✓
-	18CSE012T	Database Security and Privacy	✓	✓	✓	-	-	-	-	-	✓	-	-	-	✓	✓
-	18CSE013T	Deep Learning	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓
-	18CSE014J	Developing Web Applications in .NET	✓	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	✓
-	18CSE015T	Digital Image Processing	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓
-	18CSE016T	Distributed Computing Systems	✓	✓	✓	-	✓	-	-	-	-	✓	-	✓	✓	✓
-	18CSE017T	Embedded Computing Systems	✓	✓	✓	✓	✓	-	✓	-	✓	✓	✓	✓	✓	✓
-	18CSE018T	Free Open Source Software	✓	✓	✓	-	-	-	✓	-	-	-	-	-	✓	✓
-	18CSE019T	Green Computing	✓	✓	-	-	-	-	-	-	-	-	-	✓	✓	✓
-	18CSE020T	Information Retrieval Techniques	✓	✓	✓	✓	-	-	-	-	-	✓	-	✓	✓	✓
-	18CSE021T	Information Security	✓	✓	✓	-	-	-	-	✓	✓	✓	-	✓	✓	✓
-	18CSE022J	Insight into Cloud Computing	✓	✓	✓	-	✓	-	-	-	✓	✓	-	✓	✓	✓
-	18CSE023T	Intellectual Property Rights	✓	✓	-	✓	✓	✓	-	✓	✓	-	-	-	✓	✓
-	18CSE024T	Internet of Things	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	18CSE025J	IoT and Smart Appliances	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	18CSE026J	Mobile Computing	✓	✓	✓	✓	-	-	✓	-	-	✓	-	-	✓	✓
-	18CSE027T	Parallel Computing	✓	✓	✓	-	-	-	-	-	-	-	-	-	✓	✓
-	18CSE028J	Python Programming	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-	✓	✓	✓
-	18CSE029J	Simulation and Modelling	✓	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	✓
-	18CSE030T	Soft Computing	✓	✓	✓	✓	-	-	-	-	✓	✓		✓	✓	✓
-	18CSE031T	Software Engineering	✓	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	✓	✓
-	18CSE032T	Software Project Management	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
-	18CSE033T	Software Testing	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
-	18CSE034T	TCP/IP and Internet Programming	✓	✓	✓	-	-	-	-	✓	✓	✓	-	✓	✓	✓

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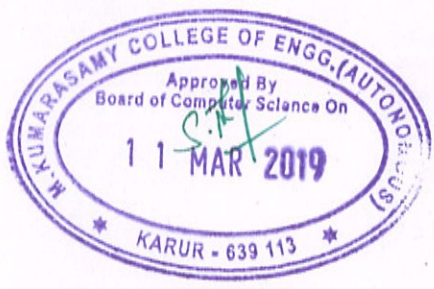
Semester	Course Code	Course Name	POs												PSOs	
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
-	18CSE035T	User Interface Technologies-Part I	✓	✓	✓	-	✓	-	-	✓	✓	-	-	✓	✓	✓
-	18CSE036T	User Interface Technologies-Part II	✓	✓	✓	-	✓	-	-	✓	✓	-	-	✓	✓	✓
-	18CSE037T	Visualization Techniques	✓	✓	✓	✓	-	✓	-	-	-	✓	-	✓	✓	✓



Structure of Curriculum

Sl.No.	Category	Credits
1	Humanities and Social Sciences including Management courses (H)	12
2	Basic Science courses (B)	26
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.(S)	22
4	Professional core courses (C)	44
5	Professional Elective courses relevant to chosen specialization/branch (E)	27/36 *
6	Open Subjects –Electives from other technical and /or emerging subjects (O)	15/6 *
7	Project work, Minor project, seminar and internship in industry or elsewhere (P)	14
8	Mandatory Courses (M) [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	04
	Total Credits	**164***

*Minor variations is allowed as per the need

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1. Humanities and Social Sciences including Management Courses (H)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

2. Basic Science Courses (B)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CYB101J	Chemistry	3	1	2	5
18PYB101J	Physics	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics	1	0	4	3
18EES101J/ 18EES101J(R) *	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J / 18CSS101J(R)	Programming for Problem Solving	1 2	0 0	4 2	3
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ECS203J	Microprocessor and Microcontroller	3	0	2	4
				Total Credits	22

L-Lecture T-Tutorial P-Practical

* FOR THE BATCH OF STUDENTS ADMITTED 2020 ONWARDS

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DATE 15/10/2020

BOS - 9

SEU – unit 1 title may be solar radiation and measurements
PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IoT – No change
FSM – Interchange the unit 3 & unit 4
Robotics – No change.
ESD & FC – No change.
EV – Course name may be changed as fundamentals of electric vehicles
IoT and ESD & FC subjects can be included in professional electives for EEE students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders
One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course content also discussed and verified.

PG 2019 Regulation.

Power System Protection Course may be added as elective course in third Semester
electronics
Analog and digital electronics Subject codes are revised

15/10/2020

1. Humanities and Social Sciences including Management Courses (H)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

2. Basic Science Courses (B)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CYB101J	Chemistry	3	1	2	5
18PYB101J	Physics	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics	1	0	4	3
18EES101J	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J / 18CSS101J(R) *	Programming for Problem Solving	1 2	0 0	4 2	3
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ECS203J	Microprocessor and Microcontroller	3	0	2	4
				Total Credits	22

L-Lecture T-Tutorial P-Practical

* FOR THE BATCH OF STUDENTS ADMITTED FROM 2019 ONWARDS

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8.10 **Syllabus Revision for 18CSS101J Programming for Problem Solving**

- Faculties and Students felt that current syllabus is too heavy. Suggested for reframing the syllabus and accepted for reframing as 2 0 2[Total Credits:3].
- Basics need to be concentrated much through practicals.

MEMBERS PRESENT

1. Dr.A.Kannan - A. Kannan
2. Dr.G.Mohana Prabha - 25/3/19
3. Dr.R.Suganya - 26/3/19
4. Dr.T.Abirami - 25/3/19
5. Ms.Nivetha Ravichandran - R. Nivetha
6. Mr.S.N.Gowtham -
7. Dr.V.Durgadevi - 25/3/19
8. Mr.A.Shanmugavelaytham - A. 25/3/19
9. Mrs.R.Sujatha - R. 26/3/19.
10. Mr.M.Gunasekar - 25/3/19
11. Mr.E.Balraj - 26/3
12. Mr.S.Vinoth (15BIT2058) - 25/3/19
13. Mr.R.Balaji (16BIT3013) - R. Balaji 25/3/19
14. Ms. B. Sinthiya (CSD Coordinator) - B 25/3/19

1. Humanities and Social Sciences including Management Courses (H)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

2. Basic Science Courses (B)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CYB101J	Chemistry	3	1	2	5
18PYB101J	Physics	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics	1	0	4	3
18EES101J	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J	Programming for Problem Solving	1	0	4	3
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ECS203J	Microprocessor and Microcontroller	3	0	2	4
				Total Credits	22

L-Lecture T-Tutorial P-Practical

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4. Professional Core Courses (C)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CSC201J	Data Structures and Algorithms	3	0	2	4
18CSC202J	Object Oriented Programming	3	0	2	4
18CSC203T	Operating Systems	3	0	0	3
18CSC204T	Computer Architecture and Organization	3	0	0	3
18CSC205J	Database Management Systems	3	0	2	4
18CSC206J	Computer Networks	3	0	2	4
18CSC207T	Design and Analysis of Algorithms	3	0	0	3
18CSC208T	Human Computer Interaction	3	0	0	3
18CSC301J	Machine Learning	3	0	2	4
18CSC302T	Compiler Design	3	1	0	4
18CSC303J	Web Programming	3	0	2	4
18CSC304J	Big Data and Analytics	2	0	4	4
				Total Credits	44

L-Lecture T-Tutorial P-Practical

5. Professional Elective courses relevant to chosen specialization/branch (E)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CSE001T	Adhoc and Sensor Networks	3	0	0	3
18CSE002T	Agile Methodology	3	0	0	3
18CSE003T	Artificial Intelligence and Robotics	3	0	0	3
18CSE004T	Bioinformatics	3	0	0	3
18CSE005T	Blockchain	3	0	0	3
18CSE006T	Building Enterprise Applications	3	0	0	3
18CSE007T	Computer Vision	3	0	0	3
18CSE008T	Cryptography and Network Security	3	1	0	4
18CSE009T	Cyber Forensics	3	0	0	3
18CSE010J	Data Science	3	0	2	4
18CSE011T	Data Warehousing and Data Mining	3	0	0	3
18CSE012T	Database Security and Privacy	3	0	0	3
18CSE013T	Deep Learning	3	0	0	3
18CSE014J	Developing Web Applications in .NET	3	0	2	4
18CSE015T	Digital Image Processing	3	0	0	3
18CSE016T	Distributed Computing Systems	3	0	0	3
18CSE017T	Embedded Computing Systems	3	0	0	3
18CSE018T	Free Open Source Software	3	0	0	3
18CSE019T	Green Computing	3	0	0	3

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18CSE020T	Information Retrieval Techniques	3	0	0	3
18CSE021T	Information Security	3	0	0	3
18CSE022J	Insight into Cloud Computing	3	0	2	4
18CSE023T	Intellectual Property Rights	3	0	0	3
18CSE024T	Internet of Things	3	0	0	3
18CSE025J	IoT and Smart Appliances	3	0	2	4
18CSE026J	Mobile Computing	3	0	2	4
18CSE027T	Parallel Computing	3	0	0	3
18CSE028J	Python Programming	3	0	2	4
18CSE029J	Simulation and Modelling	3	0	2	4
18CSE030T	Soft Computing	3	0	0	3
18CSE031T	Software Engineering	3	0	0	3
18CSE032T	Software Project Management	3	0	0	3
18CSE033T	Software Testing	3	0	0	3
18CSE034T	TCP/IP and Internet Programming	3	0	0	3
18CSE035T	User Interface Technologies - Part I	3	0	0	3
18CSE036T	User Interface Technologies - Part II	3	0	0	3
18CSE037T	Visualization Techniques	3	0	0	3
				Total Credits	27/36*

L-Lecture T-Tutorial P-Practical

6. (a) Open subjects –Electives for other technical and /or emerging subjects (O)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CSO001T	Basics of Data Structures and Algorithms	3	0	0	3
18CSO002J	Fundamentals of Python Programming	2	0	2	3
18CSO003J	Fundamentals of Java Programming	2	0	2	3
18CSO004J	Mobile Application Development	2	0	2	3
18CSO005T	Software Development using Agile	3	0	0	3

L-Lecture T-Tutorial P-Practical

6. (b) Open subjects –Electives from other technical and /or emerging subjects (O)
Civil Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CEO001T	Building Services	3	0	0	3
18CEO002T	Disaster Preparedness, Planning and Management	3	0	0	3
18CEO003T	Environmental Impact Assessment	3	0	0	3
18CEO004T	Remote Sensing and GIS	3	0	0	3
18CEO005T	Metro System and Engineering	3	0	0	3

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Electronics & Communication Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ECO001T	Microcontroller and Embedded systems	3	0	0	3
18ECO002T	Internet of Everything	3	0	0	3
18ECO003T	Wireless Mobile Communication	3	0	0	3
18ECO004T	Medical Engineering	3	0	0	3
18ECO005T	Signal and Image Processing	3	0	0	3

L-Lecture T-Tutorial P-Practical

Electrical & Electronics Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18EEO001T	Basics of Internet of Things	3	0	0	3
18EEO002T	Fundamentals of Smart Grid	3	0	0	3
18EEO003T	Robotics	3	0	0	3
18EEO004T	Energy Storing Devices	3	0	0	3
18EEO005T	Fundamentals of Electric Vehicles	3	0	0	3

L-Lecture T-Tutorial P-Practical

Electronics & Instrumentation Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18EIO001T	Basics of Automation	3	0	0	3
18EIO002T	Automotive Electronics	3	0	0	3
18EIO003T	Programmable Logic Controllers	3	0	0	3
18EIO004T	Introduction to MEMS	3	0	0	3
18EIO005T	Smart Sensor Technology	3	0	0	3

L-Lecture T-Tutorial P-Practical

Information Technology

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITO001J	Problem Solving Techniques Using Python	1	0	4	3
18ITO002J	Java Programming	1	0	4	3
18ITO003J	Game Design and Development	1	0	4	3
18ITO004J	Web Design	2	0	2	3
18ITO005J	Data Structures	2	0	2	3

L-Lecture T-Tutorial P-Practical

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Mechanical Engineering

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MEO001T	Industrial Safety for Engineers	3	0	0	3
18MEO002T	Energy Engineering	3	0	0	3
18MEO003T	Automobile Technology	3	0	0	3
18MEO004T	Advances in Nanotechnology	3	0	0	3
18MEO005T	Product Design and Development	3	0	0	3

L-Lecture T-Tutorial P-Practical

Master of Business Administration

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MBO001T	Business Ethics and Corporate Social Responsibility	3	0	0	3
18MBO002T	Human Capital Management	3	0	0	3
18MBO003T	Digital and Social Media Marketing	3	0	0	3
18MBO004T	Banking Principles and Practices	3	0	0	3
18MBO005T	Export Management and Documentation	3	0	0	3

L-Lecture T-Tutorial P-Practical

7. Project work, minor project, seminar and internship in industry or elsewhere (P)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18CSP201L	Minor Project – I	0	0	2	1
18CSP202L	Minor Project – II	0	0	2	1
18CSP301L	Minor Project – III	0	0	2	1
18CSP302L	Minor Project – IV	0	0	2	1
18CSP301N	MOOC I / Industrial Training I	0	0	2*	1
18CSP302N	MOOC II / Industrial Training II	0	0	2*	1
18CSP401L	Project work	0	0	16	8
				Total Credits	**14**

L-Lecture T-Tutorial P-Practical * -can be conducted as non contact hours

8. Mandatory Courses (M)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEM101T	Constitution of India	1	0	0	Nil
18LEM102T	Value Education	1	0	0	Nil
18GNM101L	Physical and Mental Health using Yoga	0	0	2	Nil
18GNM102L	NSS	0	0	2	Nil
18MBM201L	Competencies in Social Skills	0	0	2	1
18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
18CYM201T	Environmental Science	1	0	0	Nil
18LEM103T	Indian Tradition and Heritage	1	0	0	Nil
18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
18MBM302L	Employability Skills and Practices	0	0	2	1
18LEM301T	Indian Art Forms	1	0	0	Nil
18LEM302T	Self Development and Entrepreneurship	1	0	0	Nil
				Total Credits	4

L-Lecture T-Tutorial P-Practical

9. One Credit Courses:

Course Code	Course Name	C
18CSX001L	Animations	1
18CSX002L	Problem Solving using C++	1
18CSX003L	ReactJS	1
18CSX004L	Statistical Analysis using R	1
18CSX005T	Data Center and Cloud Basics	1
18CSX006T	Ethics in Cyber Security	1
18CSX007L	MongoDB	1

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Credit Distribution

S. No.	Stream	Credits/Semester								Credits	%	Credits as per AICTE Model
		I	II	III	IV	V	VI	VII	VIII			
1	Humanities and Social Sciences including Management courses (H)	4	4				2	2		12	7.32	12
2	Basic Science courses (B)	9	9	4	4					26	15.85	24
3	Engineering Science courses including workshop, drawing, Basics of electrical/mechanical/ computer etc.(S)	7	7	4	4					22	13.41	29
4	Professional core courses (C)			14	14	8	8			44	26.82	49
5	Professional Elective courses relevant to chosen Specialization /branch (E)					7(3)	6	8(6)	6	27/36	16.46/ 21.95	18
6	Open Electives –Electives from other technical and /or emerging subjects (O)					3(3)	3	0(6)		15/6	9.14/ 3.65	12
7	Project work, Minor project**, seminar and internship in industry or elsewhere (P)			1	1	2	2		8	14	8.54	15
8	Mandatory Courses (M) [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]			1	1	1	1			4	2.44	(non-credit)
										164*	100	159*

*Minor variations is allowed as per the need

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ISO 9001:2015 & ISO 14001:2015 Certified Institution
Thalavapalayam, Karur – 639 113.

KR

I to VIII Semester Curriculum

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J / 18CSS101J(R)	Engineering Graphics / Programming for Problem Solving / Programming for Problem Solving	1 2	0 0	4 2	3
S	18MES102J / 18EES101J / 18EES101J(R) *	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J / 18CSS101J(R)	Engineering Graphics / Programming for Problem Solving / Programming for Problem Solving	1 2	0 0	4 2	3
S	18MES102J / 18EES101J / 18EES101J(R) *	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

* FOR THE BATCH OF STUDENTS ADMITTED FROM 2020 ONWARDS

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DATE 15 | 10 | 2020

BOS - 9

SEU – unit 1 title may be solar radiation and measurements
PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IoT – No Change
FSM – Interchange the unit 3 & unit 4
Robotics – No change.
ESD & FC – No change.
EV – Course name may be changed as fundamentals of electric vehicles
IoT and ESD & FC subjects can be included in professional electives for EEE students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders
One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course content also discussed and verified.

PG 2019 Regulation.

Power System Protection Course may be added as elective course in third Semester
electronics
Analog and digital electronics subject codes are revised

15/10/2020

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I to VIII Semester Curriculum

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J /	Engineering Graphics / Programming for Problem Solving /	1	0	4	3
*	18CSS101J(R)	Programming for Problem Solving	2	0	2	
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J /	Engineering Graphics / Programming for Problem Solving /	1	0	4	3
*	18CSS101J(R)	Programming for Problem Solving	2	0	2	
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

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8.10 Syllabus Revision for 18CSS101J Programming for Problem Solving

- Faculties and Students felt that current syllabus is too heavy. Suggested for reframing the syllabus and accepted for reframing as 2 0 2[Total Credits:3].
- Basics need to be concentrated much through practicals.

MEMBERS PRESENT

1. Dr.A.Kannan - A. Kannan
2. Dr.G.Mohana Prabha - 25/3/19
3. Dr.R.Suganya - 26/3/19
4. Dr.T.Abirami - 25/3/19
5. Ms.Nivetha Ravichandran - R. Nivetha
6. Mr.S.N.Gowtham -
7. Dr.V.Durgadevi - 25/3/19
8. Mr.A.Shanmugavelaytham - A. 25/3/19
9. Mrs.R.Sujatha - R. 26/3/19.
10. Mr.M.Gunasekar - 25/3/19
11. Mr.E.Balraj - 26/3
12. Mr.S.Vinoth (15BIT2058) - 25/3/19
13. Mr.R.Balaji (16BIT3013) - R. Balaji 25/3/19

14. Ms. B. Sinthiya (PAD Coordinator) - B. 25/3/19

I to VIII Semester Curriculum

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J	Engineering Graphics / Programming for Problem Solving	1	0	4	3
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J	Engineering Graphics / Programming for Problem Solving	1	0	4	3
S	18MES102J / 18EES101J	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

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Semester III						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
S	18ECS202J	Analog and Digital Electronics	3	0	2	4
C	18CSC201J	Data Structures and Algorithms	3	0	2	4
C	18CSC202J	Object Oriented Programming	3	0	2	4
C	18CSC203T	Operating Systems	3	0	0	3
C	18CSC204T	Computer Architecture and Organization	3	0	0	3
P	18CSP201L	Minor Project - I	0	0	2	1
M	18MBM201L	Competencies in Social Skills	0	0	2	1
M	18CYM201T / 18LEM103T	Environmental Science / Indian Tradition and Heritage	1	0	0	Nil
					Total Credits	24

Semester IV						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB206T	Discrete Mathematics	3	1	0	4
S	18ECS203J	Microprocessor and Microcontroller	3	0	2	4
C	18CSC205J	Database Management Systems	3	0	2	4
C	18CSC206J	Computer Networks	3	0	2	4
C	18CSC207T	Design and Analysis of Algorithms	3	0	0	3
C	18CSC208T	Human Computer Interaction	3	0	0	3
P	18CSP202L	Minor Project - II	0	0	2	1
M	18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
M	18CYM201T / 18LEM103T	Environmental Science / Indian Tradition and Heritage	1	0	0	Nil
					Total Credits	24

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Semester V						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC301J	Machine Learning	3	0	2	4
C	18CSC302T	Compiler Design	3	1	0	4
E		Professional Elective -1	-	-	-	4
E		Professional Elective - 2	-	-	-	3
O		Open Elective - 1	-	-	-	3
E/O		Professional Elective - 3 / Open Elective - 2	-	-	-	3
P	18CSP301L	Minor Project - III	0	0	2	1
P	18CSP301N	MOOC I / Industrial Training I	0	0	2*	1
M	18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
M	18LEM301T / 18LEM302T	Indian Art Forms / Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	24

Semester VI						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH201T	Management Principles for Engineers	2	0	0	2
C	18CSC303J	Web Programming	3	0	2	4
C	18CSC304J	Big Data and Analytics	2	0	4	4
E		Professional Elective - 4	-	-	-	3
E		Professional Elective - 5	-	-	-	3
O		Open Elective - 3	-	-	-	3
P	18CSP302L	Minor Project - IV	0	0	2	1
P	18CSP302N	MOOC II / Industrial Training II	0	0	2*	1
M	18MBM302L	Employability Skills and Practices	0	0	2	1
M	18LEM301T / 18LEM302T	Indian Art Forms / Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	22

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Semester VII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH202T	Social Engineering	2	0	0	2
E		Professional Elective - 6	-	-	-	4
E		Professional Elective - 7	-	-	-	4
E/O		Professional Elective - 8 / Open Elective - 4	-	-	-	3
E/O		Professional Elective - 9 / Open Elective - 5	-	-	-	3
					Total Credits	16

Semester VIII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E		Professional Elective - 10	-	-	-	3
E		Professional Elective - 11	-	-	-	3
P	18CSP401L	Project work	0	0	16	8
					Total Credits	14

L-Lecture T-Tutorial P-Practical * - Non Contact Hour

Total Credits: 164*

*Minor variations is allowed as per the need

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Regulation 2018		Semester I	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	TECHNICAL ENGLISH	2	0	2	3

erequisite Course (s)

L

ourse Objective (s):

he purpose of learning this course is to:

LR-1	Analyze the importance of communication in personal, professional contexts. Identify proper English pronunciation
LR-2	Strengthen vocabulary and grammar. Enhance listening and writing comprehension. Review films and documentaries
LR-3	Writing brief paragraphs using appropriate techniques. Enhance their English fluency in speaking
LR-4	Write effective essays, stories. Experience workplace communication aspects
LR-5	Research on a topic and write a comprehensible academic project reports. Make effective presentations

ourse Outcome (s) (COs):

the end of this course, learners will be able to:

CO1	Identify types, modes, channels and barriers of communication, distinguish different speech sounds, pronounce correctly
CO2	Identify, rectify the errors in the use of grammar and vocabulary. Improve listening and writing skills
CO3	Develop a topic idea into a cohesive paragraph with examples. Improve the fluency of speaking skills
CO4	Develop ideas into logical and coherent essays. Understand better the workplace culture
CO5	Identify the steps involved in writing an academic project report. List and practice skills need for making a presentation

O-PO Mapping

Os	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO2	1	3	1	3	3	3	1	3	3	3	-	3	-		-
CO3	1	3	1	3	3	2	1	3	3	3	-	3	-	-	-
CO4	1	3	1	3	3	3	1	3	3	3	-	3	-	-	
CO5	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO Avg)	1	3	1	3	3	2.8	1	3	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	COMMUNICATION	6
Definition, Process of communication - (Filling in-Class Worksheets) - Verbal and Non-Verbal Communication(Individual and Group Activities - Role play)-Other Types of Communication: General-Technical-Formal, Informal- External, Internal (Write upon a selected type of communication)- Listening, Speaking, Reading, Writing(Group activity (Newspaper) – Discussion and Feedback)- Communication and Language Barriers(Individual Activity- Sharing of Personal Experiences)-Body language(Mime).		
UNIT II	**VOCABULARY AND GRAMMAR**	**7**
Words with Foreign Roots, Word Formation – Inflectional, Derivational Prefixes, Suffixes(Quiz - Identifying the Borrowed roots and Their Meanings-Worksheet Exercise)-Synonyms and Antonyms and Standard Abbreviations(Context Based Activity / Learner Compiling Standard Abbreviations from Core Subject)-Homonyms and Homophones(Fun Activities – Worksheets- Cross Words)-Articles, Tenses(Exercise through Worksheets- Individual Activity -Peer Correction- Open Discussion)- Noun-Pronoun Agreement and Subject-Verb Agreement(Identifying and Learning through Error Analysis – Worksheets)-Misplaced Modifiers - Prepositions- Prepositional verbs and Phrasal verbs(Learn through Practice – Placing Same Modifier in Different Places in a Sentence)-Prepositions- Prepositional Verbs and Phrasal Verbs(Filling in-Class Worksheets)		
UNIT III	**DISCOURSE TECHNIQUES**	**7**
Sentence Structure, Phrases and Clauses(Exercise: Worksheet, Identifying Phrases, Clauses, Compound, Complex Sentences)-Developing Ideas into Paragraphs –Cohesion Markers(Identify Topic sentence in a Paragraph; Writing a Paragraph Based on a Topic)- -Inputs on Writing Precisely, Redundancies, Wordiness-Repetition-Clichés(Error Analysis and Editing)-Defining, Describing Technical Terms(Writing Definitions-Product and Process Description)-Inputs on Classifying/Categorising and Sequencing Ideas with Relevant Diagrams(Writing a Passage on the Given hints, Tree Diagram, Classification Table and Flow Chart)-Importance of Punctuation – Miscommunication –(Fun Activities - Worksheets for Appropriate Punctuation – Written)- Errors in Punctuation(Fun Activities - Worksheets for Appropriate Punctuation – Written)		
UNIT IV	**WORKPLACE COMMUNICATION**	**6**
Reading Comprehension, Guidelines questions (Referential, Critical,Interpretative)(Practice Excercise) - Précis-writing Guidelines(Practice Excercise) - Summarising(Group Activity (Oral/Written) on the Given Passages)-Essay Writing Guidelines: Introduction, Elaboration and Conclusion with Examples(Individual Activity (Written) on the Given Topic)-Organisational Report Writing - Progress Report- Guidelines(Writing a Progress Report)-Interview Skills(Mock Interview).		
UNIT V	**PROJECT WRITING**	**5**
Topics for Project Writing(Discussion)- Collection of Data – Avoiding Plagiarism-Authenticity and Credibility of Data(Collection of Data for Verification)- Guidelines for Writing: Outline- Objectives-Background- Methodology-Discussion-Documentation(Drafting an Outline & Preparing References)-Discussion Using Sample Project(Writing the First Draft on the Selected Topic)-Checklist for Project Format (PPT)(Self-Verification and Submission of Final Draft).		
	LIST OF EXPERIMENTS	**14**

1. Often Mispronounced sounds (Audio Visual Material - Listening to minimal pairs and reproducing)
2. Barriers of communication Language barriers – videos (Identifying the Language Barriers of communication –Written)
3. Short Biographical Account on Famous Personalities –Video(Oral Paraphrasing of the Content Shown)
4. Listening to Long Conversations, Daily Life (Identify Various Communication Contexts and Answering Questions – Collocation)
5. Introduction to Englishes -British and American –Videos (Discussion on Difference between British

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	and American Words) 6. Speaking - Practice Activity – Brain Storming – Mind Mapping (Just a Minute) 7. Describing a Scene or Event –Videos (String Narration – Describing an Event or a Scene) 8. Technical Communication – Interpreting Data (Group Activity - Interpretation of Data - Oral Presentation) 9. Sample Case Studies for Work Ethics – Videos (Debate on the Videos Shown) 10. Learning Interview Techniques through Models (Mock Interview) 11. Guidelines for Preparing a PPT; Presentation Techniques (Preparing PPT on the Topic of Learners' Choice) 12. Formal Presentation
Text Book (s)	
1	Abirami K ,Technical English –, R.K.Publishers, Coimbatore.
Reference (s)	
1	Swan, Michael. Practical English Usage. OUP, 1995
2	Kumar Sanjay and PushpaLata. Communication Skills. OUP, 2011
3	CIEFL, Hyderabad. Exercises in Spoken English. Parts I-III. OUP
4	Anbazhagan K, Cauveri B, Devika M.P., English for Engineers. Cengage, 2016
5	www.mmm.english.com
6	www.onlinewriting.com/purdue
7	www.icee.org/index.html

Regulation 2018		Semester I	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB101T	CALCULUS AND LINEAR ALGEBRA	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Apply the Matrices in problems of Science and Engineering
2	Utilize Taylor series, Maxima minima and Jacobian in solving real- time application problems
3	Utilize the concepts of radius of curvature, evolute, envelope in problems of Science and Engineering
4	Apply the concept of Differential Equations in problems of Science and Engineering
5	Applications of Sequences and Series in all problems involving Science and Engineering

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Apply Matrices, Eigenvalues and Eigen Vectors and Reduction of Quadratics form in Science and Engineering problem solving
CO2	Apply Maxima and Minima, Jacobian, and Taylor series to solve problems in Science and Engineering
CO3	Identify Radius, Centre, envelope and Circle of curvature and apply them in the problem solving
CO4	Solve the different types of Differential Equations in Science and Engineering applications
CO5	Apply convergence and divergence of series using different tests and apply sequences and Series in the problem solving

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	3	-	-	3	-	-	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	3	-	-	-
CO4	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO5	-	3	3	-	-	-	-	-	3	-	-	3	-	-	-
CO (Avg)	3	3	3	3	3	-	-	-	3	-	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	EIGEN VALUE PROBLEMS	9 + 3
Characteristic equation- Cayley-Hamilton theorem (excluding proof)- Eigen values and Eigen vectors of a real matrix – Properties- Orthogonal transformation of a symmetric matrix to diagonal form-Quadratic form-Reduction of quadratic form to canonical form by orthogonal transformation.		
UNIT II	**FUNCTIONS OF SEVERAL VARIABLES**	**9 + 3**
Partial derivatives-Euler's theorem for homogenous functions-Total derivatives-Differentiation of implicit functions-Jacobians-Taylor's expansion-Maxima and Minima-Method of Lagrangian multipliers.		
UNIT III	**APPLICATIONS OF DIFFERENTIAL CALCULUS**	**9 + 3**
Curvature and Radius of curvature – Circle of curvature and Centre of curvature-Envelope- Evolute as Envelope of Normals.		
UNIT IV	**DIFFERENTIAL EQUATIONS OF SECOND ORDER**	**9 + 3**
Second order linear differential equations with constant coefficients- Particular Integrals for x^n, e^{ax}, cosax/sinax, e^{ax}cosbx/e^{ax}sinbx - Method of variation of parameters-Cauchy and Legendre's linear equation-Simultaneous first order linear equations with constant coefficients.		
UNIT V	**SEQUENCES AND SERIES**	**9 + 3**
Sequences: Definition and examples-Series : Types and Convergence - Series of positive terms-Test of convergence: Comparison test, D'Alembert's ratio test, Integral test, Rabee's Root test and Log test-Alternating series-Leibnitz's test-Series of positive and negative terms(Alternating series)-Absolute and Conditional convergence.		

Text Book (s)

1	B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Reference (s)

1	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008
2	N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008
3	G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson,Reprint, 2002
4	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010

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Regulation 2018		SemesterI/Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18PYB101J	PHYSICS	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Identify the applications of electric field on materials
CLR-2	Identify the applications of magnetic field on materials
CLR-3	Identify the significance of quantum theory
CLR-4	Create insights to the concepts of optical effects
CLR-5	Analyze the working principle of lasers and optical fibers

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Identify the effect of charge dynamics
CO2	Analyze electromagnetic induction
CO3	Apply quantum mechanics to basic physical problems
CO4	Apply ray propagation and optical effects
CO5	Identify the applications of lasers and optical fiber

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-

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UNIT I	ELECTROSTATICS AND DIELECTRIC MATERIALS	9+3

Del-divergence-curl and gradient operations in vector calculus-Gauss-divergence and Stoke's theorem-Electric field and electrostatic potential for a charge distribution-Gauss' law and its applications-Laplace's equations for electrostatic potential-Poisson's equations for electrostatic potential-Solving Problems-Concepts of electric current-Continuity equation-Laws of magnetism-Faraday's law-Ampere's law-Maxwell's equations-Solving Problems-Polarizations, permeability and dielectric constant -Polar and non-polar dielectrics -Types of polarization-Frequency and temperature dependence-Internal field in a field-Clausius-Mossotti equation-Solving Problems.

UNIT II	MAGNETIC AND SUPERCONDUCTING MATERIALS	9+3

Magnetization, permeability and susceptibility-Classification of magnetic materials-Ferromagnetism-Concepts of ferromagnetic domains –Hysteresis-Solving Problems -Properties and applications of ferromagnetic materials -Hard and soft magnetic materials -Ferrimagnetic materials - Magnetic bubbles – Ferrites- Solving Problems-Superconductivity -Properties of superconductivity -Type I & Type II superconductors-High Tc superconductors – SQUID – CRYOTRON-MAG LEV-Solving Problems.

UNIT III	QUANTUM PHYSICS	9+3

Introduction to Quantum mechanics-Explanation of wave nature of particles-Black body radiation-Compton effect-Solving Problems-Photoelectric effect-de Broglie hypothesis for matter waves - Physical Significance of wave function -Time independent Schrödinger's wave equation -Time dependent Schrödinger's wave equation -Solving Problems-Particle in a 1 D box -Normalization - Born interpretation of wave function -Properties of Matter waves-Verification of matter waves-G.P. Thomson Experiment-Solving Problems.

UNIT IV	WAVE OPTICS	9+3

Introduction to interference-Introduction to diffraction-Fresnel diffraction-Fraunhofer diffraction-Fraunhofer diffraction at single slit-Fraunhofer diffraction at double slit-Solving Problems-Fraunhofer diffraction at multiple slit-Diffraction grating-Characteristics of diffraction grating-Applications of diffraction grating-Polarization by reflection-Polarization by double refraction-Solving Problems -Scattering of light-Circular polarization-Elliptical polarization-Optical activity-Fresnel's relation -Brewster's angle--Solving Problems.

UNIT V	LASER AND FIBER OPTICS	9+3

Absorption and emission processes-two level-Einstein's theory of matter radiation A and B coefficients-Characteristics of laser beams-Amplification of light by population inversion-Threshold population inversion-Essential components of laser system and pumping mechanisms-Solving Problems-Nd: YAG laser-Semiconductor laser-CO_2laser Vibrational modes- CO_2 laser-energy level-Optical fiber-physical structure-Total internal reflection-Solving Problems-Numerical aperture - Acceptance angle-Losses associated with optical fibers-Classification of optical fibers-Optical fiber communications system-Optical sensors-Solving Problems.

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LIST OF EXPERIMENTS	30

1. Basics of experimentation
2. Determine dielectric constant of the sample
3. Calibrate Ammeter using Potentiometer
4. Calibrate voltmeter using Potentiometer
5. Determine the energy loss of magnetic materials using B-H curve experiment
6. Determine Planck's Constant
7. Study of I-V characteristics of a light dependent resistor (LDR)
8. Determine wavelength of monochromatic light by Newton's ring
9. Determine particle size using laser
10. Determine wavelength of using diffraction grating
11. Determine wavelength for a given laser source
12. Study of numerical aperture and acceptance angle of optical fiber
13. Mini project

Text books/ References:

1	David Jeffery Griffiths, Introduction to Electrodynamics, Revised edition, Pearson, 2013
2	Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th edition, 2012
3	David Halliday, Fundamentals of Physics, 7th edition, John Wiley & Sons Australia, Ltd, 2004
4	Berg and Resnick, Quantum Physics: Of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Edition, 1985

Regulation 2018		Semester I /Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18CYB101J	CHEMISTRY	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- Apply the basic principles of chemistry at both atomic and molecular levels in understanding the concepts related to the engineering field.
- Integrate the chemical principles in their projects undertaken in their respective fields
- Enhance the quality of a materials used in the product from the technological aspects for societal applications

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Identify the suitable polymeric materials fabrication processes in various application
CO2	Apply the basic principle of inorganic chemistry at the atomic and molecular levels
CO3	Apply the various thermodynamic and kinetics concepts to real system
CO4	Assemble a battery through the understanding of electrochemical principles
CO5	Catagorize the Engineering materials for their applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ENGINEERING ORGANIC MATERIALS	9*+3*

Polymer – Introduction- classification(based on molecular weight, structure and usage)- types of polymerization(Addition, Condensation and Copolymerisation)-crystallinity, melting point and glass transition temperature-mechnism of polymerization(free radical addition polymerization)-elastomer- structure and curing(vulcanization)- Fabrication and molding of polymers(Injection molding and blow molding)- Engineering plastics – PE, PVC, PMMA, Phenol formaldehyde resin , urea formaldehyde resin(Preparation, properties and uses)- Industrial applications of polymers.

UNIT II	COORDINATION AND ORGANOMETALLIC COMPOUNDS	9*+3*

Co-ordination compounds – Introduction- nomenclature- types of ligands (mono, di and poly dendate ligands)- isomerism(structural and stereo isomerism) – theories of bonding(Werner and Sidgwick Pouvell theory(EAN rule)) – applications – EDTA titration – Organometallic compounds - synthesis(organo zinc, organo Lithium and Organo magnesium) – Applications (18 electron rule, Ziegler Natta Catalyst and Hydroformylation)

UNIT III	THERMODYNAMICS AND KINETICS	9*+3*

Introduction- first and second law of thermodynamics – Gibbs –Helmholtz equation Clausius clapeyron equation – Maxwell relations – Vant hoff isotherm and Isochore (problems also)- Kinetics- Introduction- types of reactions(opposing, consecutive and parallel reactions)- chain reactions (HBr and HCl formation)- Applications of kinetics and thermodynamics.

UNIT IV	ENGINEERING ELECTROCHEMISTRY	9*+3*

Introduction- Conductors and its types - cells (Electrolytic and Electrochemical cells) – Standard electrode potential- Nernst equation of an electrode- types of electrodes (SHE and Calomal electrode)- Batteries –Types (Primary, Secondary, Flow and reserve battery)- Examples (Lead acid battery, Ni-Cd battery, Lithium battery, Lithium sulphur battery and Hydrogen- Oxygen fuel cells)- Graphene.

UNIT V	INDUSTRIAL APPLICATIONS OF CHEMISTRY	9*+3*

Cement (Types, manufacture and properties) – Paints (constitutions and functions)- Lubricants- types- mechanism – properties-abrasives – types –Diamond, Corundum, emery, garnet, quartz, Silicon carbide, carborundum-boron carbide, alundum (preparation, properties and uses) –applications – Basics of biosensor and biochips.

LIST OF EXPERIMENTS	30

1. Determination of total , permanent and temporary hardness of water sample (EDTA method)
2. Determination of alkalinity in water sample- Indicator method
3. Determination of chloride content of water sample by Argentometric method(Mohr's method)
4. Determination of dissolved oxygen content of water sample by winkler's method
5. Conductometric titration of strong acid with strong base
6. Conductometric titration of mixture of acids

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7. Determination of strength and amount of Hydrochloric acid- pH metry 8. Estimation of strength and amount of ferrous ion by potentiometric method 9. Determination of molecular weight of a polymer by viscometry method 10. Estimation of ferrous ion by colorimetry. 11. Cement analysis

Text / Reference (s) books:	
1	B.L.Tembe, Kamaluddin and M.S.Krishnan , "Engineering chemistry"
2	S.S. Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd, New Delhi (2009).
3	P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., NewDelhi (2012).
4	Shashi Chawla, Engineering Chemistry: Dhanpat Rai &Co., 3rd Edition, 2015
5	www.nptel.ac.in

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Regulation 2018		Semester I /Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES101J	ENGINEERING GRAPHICS (COMPUTER SCIENCE)	1	0	4	3

Course Objective (s):

1. Construct ellipse, Parabola, hyperbola, cycloid and involutes.
2. Sketch the projection of points, straight lines and plane surfaces.
3. Sketch the Projection of simple solids like prisms, pyramids, cylinder and cone
4. Sketch the sectional solids and developing the lateral surfaces of simple solids
5. Understand the three dimensional drawing of simple solid by isometric projection and perspective projection, and convert isometric projection to orthographic projection.

Course Outcome (s) (COs):

CO1	Apply engineering graphic fundamentals to draw/evaluate engineering curves.
CO2	Draw the graphics of engineering parts with point, line and plane projections
CO3	Draw projection of solid objects like prisms, cylinders, pyramids and cones used in engineering objects
CO4	Develop the lateral surfaces of the sectional solids.
CO5	Create 3D part models using isometric and perspective projection.

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PS O3
CO1	3	2	2	2	2	-	2	3	2	2	-	3	-	-	-
CO2	3	2	3	2	2	-	1	2	3	2	-	3	2	1	-
CO3	3	2	3	2	3	-	1	2	3	2	-	2	1	1	-
CO4	3	2	3	2	3	-	1	2	3	2	-	2	1	1	-
CO5	3	2	2	2	2	-	1	2	2	2	-	3	1	1	-
CO (Avg)	3	2	2.6	2	2.4	-	1.2	2.2	2.6	2	-	2.6	1.25	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PLANE CURVES	9
Principles of Engineering Graphics - Lettering - dimensioning - Curves used in engineering practices: Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes – Drawing of tangents and normal to the above curves.		
UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACES	9
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations. Projection of polygonal surface and circular lamina inclined to both reference planes.		
UNIT III	PROJECTION OF SOLIDS	9
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.		
UNIT IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	9
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.		
UNIT V	ISOMETRIC PERSPECTIVE AND ORTHOGRAPHICS PROJECTIONS	9
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method. Isometric to orthographic multi-view.		

Text Book (s)	
1	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2010).
2	K. Venugopal& V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 15th edition (2018).
Reference (s)	
1	1. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications, 2010.
2	2. R. L Jhala "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2015.
3	3. DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.
4	4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
5	5. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2009.

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List of Experiments.

1	Spiral and involutes using bspline or cubic spline
2	Plan of residential building
3	Simple steel truss
4	Isometric projection of simple objects
5	Creation of 3D model
6	Orthographic projection of given 3D object
7	Projection of planes with inclination to reference plane
8	Solids with inclination to one reference plane
9	Section view of simple solids
10	Development of solids

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Regulation 2018		Semester I / Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J(R)	PROGRAMMING FOR PROBLEM SOLVING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	Learn programming using a structured programming language
CO2	Provide exposure on C programming.
CO3	Introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

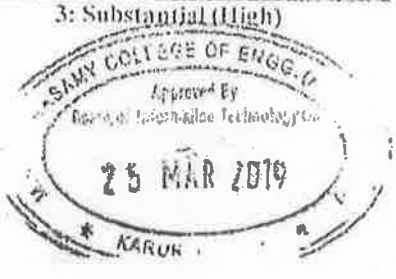
At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	INTRODUCTION	6
Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems– Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.		
UNIT II	C PROGRAMMING BASICS	6
Structure of a 'C' program – Tokens - Data Types – Operators –Input and Output operations - Decision Making and Branching – Looping statements.		
UNIT III	ARRAYS AND STRINGS	6
Arrays: Declaration – Initialization – One dimensional and Two dimensional arrays - String: String Declaration and Initialization–String Functions.		
UNIT IV	STRUCTURES AND POINTERS	8
Introduction to Structures-Need for Structure Data type – Structure: Definition, Declaration – Structure vs Union. Pointers - Definition – Initialization - Pointers arithmetic – Pointers and arrays –Null Pointer – Pointer to Structures		
UNIT V	FUNCTIONS	4
Function – Definition of function – Declaration of function – Function Prototype – Pass by value – Pass by reference.		
LIST OF EXPERIMENTS		15

1. Programs on Operators
2. Programs on Control statements
3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array
5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Pointers
9. Programs on Structures
10. Programs on Union

Text Book (s)

1	Anita Goel and Ajay Mittal. "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2	PradipDey, Manas Ghosh. "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009

Reference (s)

1	Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
2	Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
3	Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
4	Yashavant P. Kanetkar, "Let Us C", BPB Publications, 2011.

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25 MAR 2019
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Regulation 2018		Semester I / Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J	PROGRAMMING FOR PROBLEM SOLVING	1	0	4	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	To learn programming using a structured programming language
CO2	To provide exposure on C programming.
C03	To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO C	9

Evolution of Programming & Languages - Problem solving through programming - Creating algorithms - Drawing flowcharts - Writing pseudocode - Evolution of C language, its usage history - Input and output functions: Printf and scanf - Variables and identifiers - Expressions, Constants - Keyword ,Single line and multiline comments- Values, Names, Scope - Binding, Storage Classes - Input and Output Statement - Numeric Data types - Non-Numeric Data types: char string - Non-Numeric Data types: string - Increment operator - decrement operator - Comma, Arrow and Assignment operator - Sizeof operator - Bitwise operators - Relational Operators - logical Operators - Conditional Operators - Operator Precedence

UNIT II	CONTROL STATEMENT AND ARRAY	9

If statement in expression - L value and R value in expression - Control Statements – if and else – else if – nested if - switch case - Iterations – While loop - do..While loop - For loop - Goto, break, continue - Array Basic and Types - Array Initialization and Declaration - Initialization: one Dimensional Array, Accessing - Indexing one Dimensional Array Operations - Initializing and Accessing 2D Array - Initializing Multidimensional Array - Array Advantages and Limitations

UNIT III	STRINGS AND FUNCTIONS	9

String Basics - String Declaration and Initialization - String Functions: gets(), puts(), getchar() - putchar(), printf()atoi(), strlen()strcat(), strcmp()sprint(), sscanf()strcpy(), strstr()Strrev(), strtok()Functions basics - Functions declaration and definition - Types: Call by Value - Call by Reference - Function with Arguments and no Return Values - Function without Arguments and no Return Values - Function with Arguments and Return Values - Function without Arguments and Return Values - Passing Array to Functions - Returning array from functions - Formal and Actual Parameters - Recursion Functions - Advantages of using Functions

UNIT IV	POINTERS	9

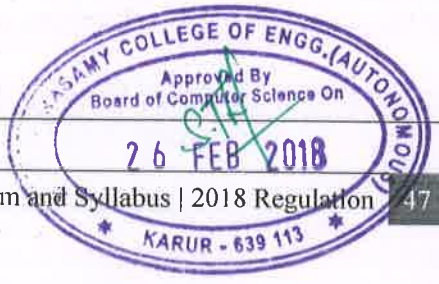
Pointers Basics - Address operator - Pointer Declaration - dereferencing pointers - Size of Pointer Variable and Pointer Operator - Void Pointers and size of Void Pointers - Arithmetic Operations - Incrementing Pointers - Constant Pointers - Null Pointers - Pointers to array elements - Pointers to strings - Function Pointers

UNIT V	STRUCTURES AND UNIONS	9

Structure basics & declaration - Initializing Structure, Accessing members - Nested structure - Array of structure - Accessing elements in a structure array - Passing Array of structure to function - Union Basic and declaration - Accessing Union Members - file: opening, defining - File closing, File Modes, File Types - Writing contents into a file - Reading file contents - Appending an existing file - File permissions and rights - Changing permissions and rights

LIST OF EXPERIMENTS	15

1. Programs on Operators
2. Programs on Control statements
3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array
5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Function prototypes
9. Programs on Passing and returning Array to Functions



10. Programs on Recursion Functions 11. Programs on Pointers 12. Programs on Structure 13. Programs on Union 14. Programs on Files	
Text Book (s)	
1	Zed A Shaw, Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C), Addison Wesley, 2015
2	Bharat Kinariwala, TepDobry, Programming in C, eBook
3	W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd ed. Prentice Hall, 1996

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26 FEB 2018
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Regulation 2018		Semester I / II	Total 3ours			75
Category	Course Code	Course Name	3ours / Week			C
			L	T	P	
S	18MES102J	BASIC CIVIL AND MECHANICAL ENGINEERING (CSE)	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

- Select building materials and identify the components of a building
- Identify the various transportation systems, bridges, dams and water supply system
- Apply the concept of Harnessing energy from various energy sources
- Know the working of IC engines and identify the sub system requirements
- Apply manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

Course Outcome (s) (COs):

CO1	Identify the building materials and its applications
CO2	Identify different transportation system, water supply system and its applications
CO3	List the basic components and analyze the working of major power plants
CO4	Identify the working of IC engines and understand the need of various auxiliary systems
CO5	Identify manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	-	3	3	-	-	-	-	3	-	-
CO2	3	-	3	-	3	3	3	-	3	-	-	3	-	-
CO3	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3		3		3	3	3		3			3		

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UNIT I	BUILDING MATERIALS	9

Introduction to Civil Engineering, Building Materials, History, Disciplines in Civil Engineering, Early constructions and development over time, Ancient Monuments: Peruvudaiyar or Brihadeeswarar Temple, Kallanai dam Grand Anicut, Taj Mahal, Golconda fort, Angkor Wat, Pyramids of Giza, Colosseum Development of various materials, Methods of Construction, Building Materials - Stone – Classification of Rocks, Quarrying, Dressing, Properties and Uses of Stone Mortar, Plain and Reinforced Cement, Concrete Grade and properties and uses, Necessity of Special Concrete, Self Compacting Concrete, Construction Chemicals (Plasticizers), Recycling: construction, demolition wastes, Buildings, Classification of Buildings, Selection of site for a building, Components of Buildings, Soil, General types of soil, Bearing Capacity, Factors affecting bearing capacity, Foundations: Functions, General types of, foundation, Shallow foundations

UNIT II	TRANSPORTATION AND WATER SYSTEM	9

Cement concrete flooring, Marble flooring, Granite flooring, Ceramic tile flooring, Roofs: Types of roofs, Madras terrace roof, Reinforced concrete roofs, Trussed roof, Roof Coverings: Types, Weathering course: Types, Mode of Transportation - Highways - Classification of Roads, Cross section details of flexible pavements, Railways – Zone and Headquarters, Permanent way and its requirement, Components of Permanent way, Bridges: Components of Bridge, Types, Dams: Purpose, Classification, Gravity dams - Advantages and Disadvantages, Elements of protected Water Supply system, Objective, Quantity of water, Design period, Per-capita demand, Factor affecting per capita demand, Sources of Water Supply, Standards of Drinking water, Drinking Water Treatment: Objectives, Treatment plant process, Sewage: Method of collection, Sewage treatment and disposal

UNIT III	POWER PLANTS	9

Coal based thermal Power Plant: layout, components description,working, advantages, disadvantages, Hydro Electric power plant: layout, components description, working, advantages and disadvantages, Nuclear power plant: Nuclear fission and fusion reactions, Nuclear reactor, components description, Layout, working, merits and demerits of boiling water reactor , Layout, working, merits and demerits of pressurized water reactor, Gas turbine power plants:componentsdescription,working and types gas turbines, methods to improve performance, Layout and working of open cycle plant with intercooling, reheating, regeneration, Solar Thermal power plant: layout of Flat plate collector based plant, central receiver type plant, advantages, disadvantages, Wind energy conversion system – wind turbine types, Working, advantages and disadvantages, Ocean Thermal Energy Conversion system: layout of open cycle , Layout of closed cycle, advantages, disadvantages

UNIT IV	INTERNAL COMBUSTION ENGINES	9

Engine: Classification,operations of 2 stroke & 4 stroke, Comparison of SI & CI engines, Fuel supply system and Battery ignition system, Magneto ignition system of SI engine, Working of a simple carburetor, GDI, MPFI, CRDI, Lubrication system of an engine, Functions and Working of mist and forced feed lubrication system, Cooling system of an engine – Working of air cooled (fins), Water cooled engines (forced circulation), Alternate fuels for IC Engines. Liquid fuels: methanol, ethanol, vegetable oil, Biodiesel, Gaseous fuel: Hydrogen, CNG, LPG, properties, advantages, disadvantages, Emissions from engine – Emission standards – Euro, BS, Emission control measures – Catalytic converter, Exhaust gas recirculation, Introduction to electric vehicles, Hybrid and autonomous vehicles

UNIT V	CASTING AND FORMING PROCESS	9

Casting introduction and history, Expandable mold casting process , Production steps in a typical sand-casting process, terms including patterns and core, Other expendable mold casting: shell molding, vacuum molding, expanded polystyrene process, Investment casting, Permanent mold casting: hot chamber and cold chamber

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die casting & Permanent mold casting:Semi centrifugal and centrifuge casting, Metal forming introduction and its classification, metals and alloys,Bulk deformation: hot, cold forging processes, hot rolling processes,cold rolling processes, Rolling mill classification, hot and cold extrusion processes, wire and bar drawing processes, Sheet metal working, applications. Cutting operations: shearing, blanking, punching, cutoff, parting, slotting, perforating, notching, trimming, shaving, fine blanking, Bending operations: V-bending, edge bending, flanging, hemming,seaming, curling, spring back effect, Drawing operations, its defects, coining, embossing, ironing, lancing, twisting	
Text Book (s)	
1	Dr.V.Rameshbabu,"Basic Civil and Mechanical Engineering", VRB Publishers pvt ltd, 2017
Reference (s)	
1	SeropeKalpakjian, Steven Schmid," Manufacturing Processes for Engineering Materials", Pearson, 2016
2	Drbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, "Power Plant Engineering", Kluwer Academic Pub., 1995
3	Andy Walker, "Solar Energy", John Wiley & Sons, 2013
4	John B. Heywood, "Internal Combustion Engine Fundamentals", Tata McGraw Hill Education, 2017
5	Kumar. T, LeenusJesu Martin and Murali. G, "Basic Mechanical Engineering", Suma Publications, Chennai, 2007.

LIST OF EXPERIMENTS

Total: 30hours

1.	Study of wood types, carpentry tools, operations and safety precautions.
2.	To make various carpentry joints like T-joint, lap joint, bridle joint, mortise tenon joint and etc.
3.	Study of pipeline joints, its location and functions in household fittings.
4.	Preparation of single tap, multi tap and shower connection by using GI and PVC pipes.
5.	Study about basics of fitting process, tools and method of producing models.
6.	Preparation of square, half round, step, V, T fitting of two metals by using fitting tools.
7.	Study of cutting, bending operations and tools used in sheet metal processes.
8.	To make trays, cone and funnel by using sheet metal operations.
9.	Study of welding types, tools, equipments and welded joints.
10.	Preparation of butt joints, lap joints and T-joints by shielded metal arc welding.
11.	Study about the types, properties and uses of brick, stone and cement.
12.	Study about water supply, distribution System, water treatment plant, sewage system
13.	Study about the basics of casting processes and equipments.

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Regulation 2018		Semester - I / Semester - II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18EES101J(R)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

NIL

Course Objective (s): The purpose of learning this course is to:

1	Gain the knowledge about D.C and A.C circuits.
2	Impart the fundamentals of electrical machines.
3	Study the fundamentals of semiconductor devices
4	Study the working concepts of measuring instruments.
5	Know about digital logic concepts and operational amplifier.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Apply the concepts of ohm's law and Kirchhoff's law in DC and AC circuits
CO2	Explain the basic concepts of DC motor, DC generator, Transformer and Induction motor.
CO3	Summarize the nature of semiconductor devices.
CO4	Interpret the concept of measuring devices like PMMC, MI, energy meter and wattmeter.
CO5	Infer the concept of electronics devices and conversion techniques

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1
CO2	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO3	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO4	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO5	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO (Avg)	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTRICAL CIRCUITS	9

Electrical quantities: Resistors, Inductors, Capacitors - Ohm's Law - Kirchoff's Laws -Series and Parallel circuits - Analysis of DC circuits: Mesh & Nodal analysis, Thevenin's Theorem, Norton's Theorem & Maximum Power Transfer Theorem, Star delta Transformation, RL & RC Transient Analysis. Introduction to AC Circuits: Waveforms and RMS Value – Power and Power factor- Introduction to three phase systems – Types of connections, Relationship between line and phase values.

UNIT II	ELECTRICAL MACHINES	9

Faraday's laws- Construction, Principle of Operation, Basic Equations of DC Generators, DC Motors – Two Point & Three Point Starter – Construction, Working and EMF Equation of Single Phase Transformer – Construction and Working of AC Generator – Three Phase Induction Motor: Construction and Working of Squirrel Cage and Slip Ring Induction Motor – Single Phase Induction Motor (Split Phase, Capacitor Start Induction Motor).

UNIT III	ELECTRONIC DEVICES	9

Intrinsic and Extrinsic Semiconductors – PN junction diode , Zener diode and its Characteristics – Operation of Half Wave, Full Wave and Bridge Type Rectifiers – Bipolar Junction Transistor: Configurations and Characteristics of CB, CE, CC – Construction and Operation of JFET, MOSFET.

UNIT IV	MEASUREMENTS	9

Basic Principles and Classification of Instruments – Construction and Working of PMMC, MI Instruments (Attraction & Repulsion type) – Principle of Operation of Dynamometer Type Wattmeter, Induction Type Energy Meter – Instrument transformer – CRO – Megger.

UNIT V	DIGITAL & INTEGRATED CIRCUITS	9

Number Systems – Boolean Theorems– Logic Gates – Half Adder and Full Adder Circuit – Flip-Flops: RS, JK, T and D – A/D Converter (Successive Approximation Type) – D/A Converter (Binary Weighted Type) – Op-Amp : Functional Block and Types (Inverting , Non-Inverting & Differential Amplifier).

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LIST OF EXPERIMENTS	15
1. Verification of Ohm's & Kirchoff's Laws 2. Types of Wiring (Fluorescent Lamp & Staircase) 3. Verification of Thevenin's Theorem 4. Verification of Norton's Theorem 5. Characteristics of PN Junction Diode 6. Characteristics of Common Base Configuration. 7. Characteristics of Common Emitter Configuration. 8. Measurement of Ripple Factor: Half Wave & Full Wave Rectifier. 9. Study of AC and DC Machines 10. Verification of Logic Gates 11. Study of PMMC and MI Meters	

Text Book (s)	
1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering," Tata McGraw-Hill, 2012
2	Sawhney, A.K., "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2011.
Reference (s)	
1	Dash.S.S, Subramani.C, Vijayakumar.K, "Basic Electrical Engineering", Vijay Nicole, 1st Edition, 2013.
2	Jegatheesan.R, "Analysis of Electric Circuits", Tata McGraw-Hill, 2014.
3	Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd Edition, 2010.

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Regulation 2018		Semester I/ Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18EES101J	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Analyze given electric circuits consisting of active and passive components.
2	Identify the parts, functions and working of motors, generators and transformers that function in AC and DC.
3	Utilize the basic electronic devices and circuits.
4	Utilize the working concept of measuring instruments.
5	Build simple logical circuits using Boolean expressions. Identify elements in Integrated circuit.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss basic theory utilized in electrical circuits and its circuits.
CO2	Describing working principle of direct current and alternative current machines such as transformers, motors and generators.
CO3	Operate the basic electronic devices. Identify their uses and construction features.
CO4	Interpret the concept of measuring devices like PMMC, MI ,energy and wattmeter.
CO5	Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a Integrated circuit.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO2	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO3	3	-	1	1	2	-	2	2	2	2	-	2	-	-	-
CO4	3	-	1	1	1	-	2	2	2	2	-	2	-	-	-
CO5	3	2	2	2	2	-	2	2	2	2	-	2	-	-	-
CO (Avg)	3	2	1.2	1.2	1.8	-	2	2	2	2	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTRICAL CIRCUITS	12

Introduction to DC and AC circuits, Active and Passive two terminal elements, Ohms law,Voltage-Current relation, Power, Energy, R,L,C Circuits, Voltage and Current Sources, Kirchoff's current law, Kirchoff's voltage law, Problem Solving Session, Mesh Current Analysis, Nodal Voltage Analysis, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Star- Delta Transformation, Problem Solving Session, Resistive Circuit Analysis, Superposition, Convolution, RL Circuit Transient Analysis, RC & RLC Transient Analysis , Three Phase Systems, Star and delta Connections, Relation between Line and, Phase, Problem Solving Session.

UNIT II	DC MACHINES & AC MACHINES	12

Sinusoids, Generation of AC, Average, RMS values, Form and peak factors, Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor, Magnetic materials, B-H Characteristics Simple magnetic circuits, Faraday's laws, induced emf and inductances. 1 - Phase transformers: Construction, types, ideal, practical transformer, EMF equation, Regulation, Efficiency, Problem Solving Session, Construction, working of DC Generators, Types of DC generators, Characteristics of Generators, Applications of DC generator, Working and types of DC motors, Characteristics , Two point starter and Three point starter, Problem Solving Session, AC generators (Alternators), Construction, working, Characteristics of Alternators, Losses, Single Phase motors: Split phase induction motor & Capacitor start induction motor, Working and types of single phase AC motors, Squirrel Cage and Slip ring induction motor, Types of AC starters (Autotransformer, star-delta and Rotor resistance starter), Problem Solving Session.

UNIT III	ELECTRONIC DEVICES	12

Overview of semiconductors, Intrinsic and Extrinsic semiconductors, Operation of PN Junction diode , Characteristics of PN Diode, Operation of Zener diode, Characteristics of Zener Diode, Overview of diode circuits, Operation of Half-wave rectifier, Half wave : Ripple factor Expression, Advantages, Disadvantages, Operation of Full-wave rectifier, Full wave : Ripple factor Expression, Advantages, Disadvantages, Bridge type rectifier operation, Comparison of rectifier circuits, Overview of filters and its uses, BJT construction, operation, BJT characteristics (CB, CE and CC configurations) and uses, JFET construction, operation, JFET characteristics (Drain and Transfer characteristics), Depletion mode and Enhancement mode MOSFET construction operation, MOSFET characteristics (Transfer and output characteristics), Problem Solving Session.

UNIT IV	MEASUREMENTS	12

Methods of measurements – Overview, Types of Measurements: Primary, Secondary, Tertiary, Basic principles and Classification of Instruments- Indicating, Recording and Integrating, Construction and working of PMMC, PMMC-Torque Equation, Advantages, Disadvantages, Construction and working of MI Instruments, MI (Attraction type)-Operation, MI Attraction type-Advantages , Disadvantages, MI (Repulsion type)- Operation, Torque Equation, MI (Repulsion type)- Errors, Advantages, Disadvantages, Overview of Instrument Transformers, Current Transformer, Potential Transformer, CRO, CRT, Operation of Dynamometer type watt meter, Advantages and Disadvantages, Operation of Induction type watt meter, Advantages and Disadvantages, Megger –Construction, Working, Measurement of Earth resistance

UNIT V	DIGITAL AND INTEGRATED DEVICES	12

Number systems, binary codes, Binary arithmetic, Boolean algebra, laws and theorems, Simplification of Boolean expression, Logic Gates and Operations, Simplification of Boolean expression, Problem Solving Session, SOP and POS Expressions, Standard forms of Boolean expression, Simplify using Boolean Expressions, Minterm and Maxterm, K-Map Simple Reduction Technique, Two, Three and Four Variable K-Map, Problem Solving Session, Half adder circuit, Full adder circuit, Flip-flops : RS , JK, T and D Flip-flops, A/D Converter-Successive Approximation , D/A Converter-Binary Weighted, Overview of Op-Amp, Op-Amp : Functional block & Types (Inverting, Non-inverting & differential amplifier).

LIST OF EXPERIMENTS	30

1. Verification of Kirchoff's Law
2. Verification of all Theorems,
3. Time Domain Analysis (RL, RC).

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4. Types of wiring (Flourescent lamp,Stalrcase ,godown wiring).	
5. Demo of DC Machine & Parts	
6. Demo of AC Machine & Parts.	
7. Characteristics of semiconductors	
8. Measurement of Ripple factor (Half-wave and Full-wave).	
9. Characteristics of CB and CE configurations	
10. Demo of PMMC and MI Meters,	
11. Waveform verification using CRO,	
12. Measurement of Energy using Single phase Energy meter.	
13. Verification of Boolean expression using logic gates.	
14. Reduction using Digital Logic Gates.	
15. Design and test of Inverting and Non-Inverting Amplifier using IC741	
Text Book (s)	
1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012
Reference (s)	
1	Dash.S.S, Subramani.C, Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013.
2	Jegatheesan.R,Analysis of Electric Circuits, Tata McGraw-Hill; 2014.
3	P. S.Bimbhra ,Electrical Machinery,7th ed,. Khanna Publishers, 2011.
4	Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011.
5	Sawhney A.K., A Course in Electrical & Electronic measurements and Instrumentation,Dhanpat Rai and Co,2011.

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Regulation 2018		Semester I/Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH101L	PROFESSIONAL SKILLS AND PRACTICES	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Equip students with different aspects of Presentation
CLR-2	Train students to use appropriate language for publics peaking.
CLR-3	Help students better understand basic leadership qualities and personality traits
CLR-4	Train the students to face interview confidently.
CLR-5	Make students understand how setting goals in life is important.

Course Outcome (s) (COs):

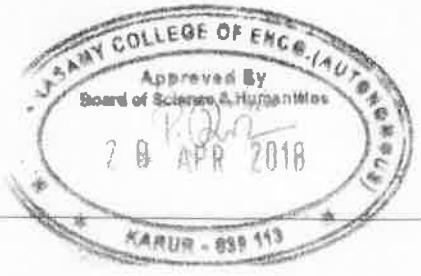
At the end of this course, learners will be able to:

CO1	Make presentation in a formal way.
CO2	Speak with clarity and confidence, thereby enhancing their employability skills.
CO3	Enable students to understand different aspects of leadership and evaluate in their own strengths.
CO4	Clear the job interview successfully.
CO5	Realize that selecting goal is a fundamental component to long- term success of an individual.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO2	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO3	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO(Avg)	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	PRESENTATIONS	5
Tips and Techniques for an Effective Presentation - Effective presentation structure - Types of Presentation - Verbal aspect of a presentation - Non-verbal aspect of a presentation – body language - Stress management during a presentation		
UNIT II	**PUBLIC SPEAKING**	**5**
Importance of Public Speech - Dealing with fear and Anxiety - Tips and Techniques for Public Speaking - Informative Speech - Delivering a Persuasive Speech - Dealing with audience questions		
UNIT III	**LEADERSHIP SKILLS**	**5**
Communication – Motivation – Delegating – Creativity – Responsibility - Commitment		
UNIT IV	**INTERVIEW SKILLS**	**5**
Preparing for a Job Interview - The Interview Process - Telephone Interviews - Interview Techniques - Mock Interview - Mock Interview		
UNIT V	**GOAL SETTING**	**5**
Types of goals - Reasons for goal setting - Goal Setting Process - S.M.A.R.T. goals - Tips and Techniques for Goal Setting - Trouble in Setting Goals		

LIST OF EXPERIMENTS — 5

1. Make a presentation on a general topic
2. Give a persuasive speech
3. Exhibit your leadership qualities
4. Mock interview
5. Share your realistic short term and long term goals and the ways to attain them.

Text Book (s)

	NIL

Reference(s)

1	Aruna Koneru, Professional Communication, Tata McGraw-Hill Publishing Company Limited, New Delhi
2	Professional Skills and Practice, Oxford University Press
3	https://www.skillsyouneed.com
4	https://www.Business English Site.com

Regulation 2018		Semester I/ Semester II	Total Hours			30
ıtegory	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH102L	GENERAL APTITUDE	0	0	2	1

erequisite Course (s)

-I

urse Objective (s):

e purpose of learning this course is to:

.R1	Recapitulate fundamental mathematical concepts and skills
.R2	Hone critical thinking skills by analyzing the arguments with explicit and implicit premises
.R3	Sharpen logical reasoning through skillful conceptualization
R4	Identify the relationships between words based on their function, usage and characteristics
.R5	Nurturc passion for enriching vocabulary
.R6	Acquire the right knowledge, skill and aptitude to face any competitive examination.

ırse Outcome (s) (COs):

he end of this course, learners will be able to:

)1	Build a strong base in the fundamental mathematical concepts
)2	Identify the approaches and strategies to solve problems with speed and accuracy
)3	Gain appropriate skills to succeed in preliminary selection process for recruitment
)4	Collectively solve problems in teams and groups
)5	Build vocabulary through methodical approaches
)6	Enhance lexical skills through systematic application of concepts and careful analysis of style, syntax, semantics and logic

)-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO2	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO3	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO4	1	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO5	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO6	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
(Avg)	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-

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UNIT I		6
Types of numbers, Divisibility tests -Introduction to Significance of Verbal Aptitude in Competitive Examinations - LCM and GCD -Vocabulary enrichment techniques - Unit digit, Number of zeroes, Factorial notation - Vocabulary enrichment Techniques.		
UNIT II		6
Square root, Cube roots, Remainder - Identities - Contextual Vocabulary Exercise - Synonyms Fractions and Decimals, surds -Contextual Vocabulary Exercise -Antonyms		
UNIT III		6
Percentage Introduction - Sentence Completion Basic Level Exercises : Single Blank - Percentage Problems - Sentence Completion Basic Level Exercises : Double Blank - Profit and Loss - Cloze Test		
UNIT IV		6
Discount -Reading Comprehension – Introduction -Simple Interest - Reading Comprehension – Summary & Main Idea - Compound Interest, Installments - Reading Comprehension – Summary & Main Idea		
UNIT V		6
Logarithms Intro - Grammar Rules :A comprehensive Introduction - Logarithms Rules - Sentence Completion – Grammar - Linear Equations - Spotting Errors		
Text Book (s)		
1	Nil	
Reference (s)		
1	Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002	
2	Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010	
3	Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition	
4	Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014	
5	Wiley's GMAT Reading Comprehension Grail, Wiley, 2016	
6	Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition	
7	Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013	
8	Nishit K. Sinha, The Pearson Guide to Quantitative Aptitude and Data Interpretation for the CAT	
9	Dinesh Khattar-The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations	

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Regulation 2018		Semester I	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM101T	CONSTITUTION OF INDIA	1	0	0	-

erequisite Course (s)

L

urse Objective (s):

e purpose of learning this course is to:

LR-1	Utilize the citizen's rights
LR-2	Utilize the basic citizen's fundamental rights of freedom of speech, expression, equality, religion and privacy
LR-3	Identify the Indian constitutional framework with union parliament, government and their functions and citizen's rights
LR-4	Utilize the States functionality and provisions for the betterment of the individual and society
LR-5	Identify the emergency provisions, the functions of election and public service commissions, identify the tax system

urse Outcome (s) (COs):

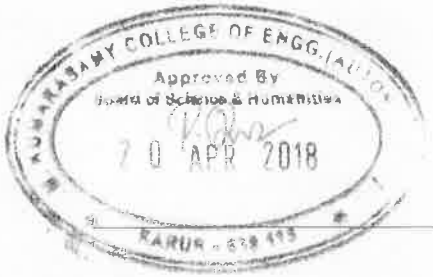
the end of this course, learners will be able to:

O1	Identify the basic provisions in the Indian constitution
O2	List the fundamental rights, rights to equality, freedom, religion, culture, education and the right against exploitation
O3	Identify the fundamental duties of the Union of India, President, Vice-President, Union Ministers and Parliament functions
O4	Identify the power of states, its legislature, Governors role and the state judiciary
O5	List the special provisions and functionality of election commission, public service commission, individual tax and GST

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
O1	-	-	-	-	-	-	2	3	3	3	-	3	-	-	-
O2	-	-	-	-	-	-	2	3	3	3	-	3	-	-	-
O3	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
O4	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
O5	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
(Avg)	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	INDIAN CONSTITUTION	3
Meaning of the Constitution law and Constitutionalism- Historical perspective of the Constitution of India- Salient features and characteristics of the Constitution of India Citizenship- Scheme of the fundamental rights- Scheme of the Fundamental Duties and its legal status		
UNIT II	**FUNDAMENTAL RIGHTS**	**3**
The Directive Principles of State Policy- Scheme of the Fundamental Right to Equality- Scheme of the Fundamental Right to certain Freedom under Article 19- Scope of the Right to Life and Personal Liberty under Article 21- Union Government, Union Legislature (Parliament)- LokSabha and RajyaSabha (with Powers and Functions), Union Executive		
UNIT III	**POWERS AND FUNCTIONS OF CENTRAL GOVERNMENT**	**3**
President of India (with Powers and Functions)- Prime Minister of India (with Powers and Functions) - Union Judiciary (Supreme Court)- Jurisdiction of the Supreme Court - State Government, Legislature, Legislative Assembly, Legislative Council- Powers and Functions of the State Legislature, State Executive- Governor of the State (with Powers and Functions)		
UNIT IV	**POWERS AND FUNCTIONS OF STATE GOVERNMENT**	**3**
The Chief Minister of the State (with Powers and Functions)- State Judiciary (High Courts) Union Territory, Panchayat, Municipality- Scheduled and Tribal Areas- Co-operative Societies Consumer Rights - Consumer Protection Act		
UNIT V	**POWERS AND FUNCTIONS OF ELECTION AND SERVICE COMMISSION**	**3**
Local Self Government – Constitutional Scheme in India-Emergency Provisions : National, President Rule, Financial Emergency - Election Commission of India (with Powers and Functions) - The Union Public Service Commission (with Powers and Functions) - Amendment of the Constitutional Powers and Procedure -Income Tax, Goods and Services Tax		

Text Book (s)

	NIL

Reference (s)

1	DurgadasBasu, Introduction to the Constitution of India,Lexis- Nexis, 2015
2	Subash C Kashyap, Our Parliament, National Books Trust, 2011
3	Kaushal Kumar Agarwal, India's No 1 book on Tax : Simple Language Advanced Problems: Income Tax, Kindle, 2017
4	Vivek K R Agarwal, GST Guide for students: Making GST – Good and Simple Tax, Neelam Book House, 2017

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Regulation 2018		Semester I&II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18GNM101L	Physical and Mental Health using Yoga	0	0	2	0

Prerequisite Course (s) Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	provide deeper insight into the curriculum of Yogic Sciences along with the practical applications of Yoga
CLR-2	intend that students should get familiar with the poses of Yogasanam.
CLR-3	Promote positive health in the Student through Yoga and enabling and imparting skill in them to practice and apply Yogic
CLR-4	practice for Health to general public and teach Yoga for Total personality development and spiritual evolution.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	increase the muscle strength
CO2	improve respiration, energy and vitality.
CO3	maintain a balanced metabolism and weight reduction.
CO4	maintain cardio and circulatory health.
CO5	improve athletic performance and protection from injury.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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	Introduction:	**6**
▪ Human Body- Meaning and its Importance in Yoga ▪ Definition of Anatomy and Physiology ▪ Cell: Structure & Function		
	General information, Different parts, Structure, Function and Effect of Yogic Practices.	**24**
▪ Tissues: Types, Structure & Function. ▪ Musculo-Skeletal System ▪ Digestive system ▪ Excretory system ▪ Respiratory system ▪ Circulatory system ▪ Nervous System ▪ Endocrinal system		

Text / Reference (s) books:

1.	Shirley Telles - A Glimpse of the Human Body The structure anf Functions, Swami Vivekananda Yoga Prakashana, Bangalore.
2.	Makarand Madhukar Gore - Anatomy and Physiology of Yogic Practices, Motilal Banarsidass, New Delhi, 2007
3.	Anne Waugh, Allison Grant - Ross and Wilson Anatomy and Physiology in Health & Illness, Churchill Livingstone; 2010

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Regulation 2018		Semester II	Total Hours			45
ategory	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	PROFESSIONAL ENGLISH	2	0	2	3

erequisite Course (s)

arse Objective (s):

purpose of learning this course is to:

R-1	Develop team spirit and stress management skill
R-2	Demonstrate the interpersonal skills of the learners
R-3	Make learners perform well in interviews
R-4	Enable them to listen well and express their ideas, opinions effectively in official contexts
R-5	Sharpen their reading comprehension skill
R-6	Strengthen their official written communication skill.

rse Outcome (s) (COs):

he end of this course, learners will be able to:

01	Work in a team under any situation
02	Practice interpersonal relationships in workplace
03	Face interviews confidently and successfully
04	Participate and excel in role plays, presentations and formal conversations.
05	Read and infer the meanings of technical and aesthetic passages.
06	Draft official letters, reports, memos, emails, etc.,

-PO Mapping

Os	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
O1	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
O2	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
O3	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
04	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
05	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
06	1	1	3	3	3	3	1	3	3	3	-	3	-	-	-
O vg)	1	2.66	1.33	3	3	3	1	3	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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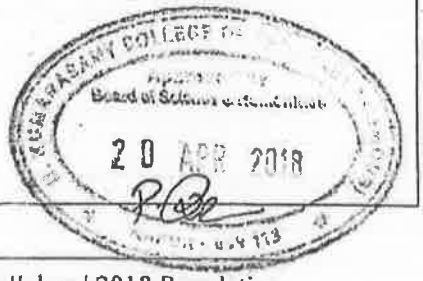
UNIT I	SOFT SKILLS	7
Introduction to Soft Skills(MCQ on Soft Skills)-Leadership Skills(Handling a Team) -Optimism & Business Etiquettes(Presentations on How to Handle Situations Effectively)-Team Management (Motivational Videos on Positive Thinking)- Time Management(Discussion on Real Time Hardships) -StressManagement(Handling Criticism)-Organizational Communication - Channels of Communication(Case Study).		
UNIT II	**LISTENING**	**7**
Listening Skills: Active Listening, Passive Listening(Classroom Listening Activities)-Methods for improving Listening Skills, Listening and its process – Barriers to Listening(Innovative Practices and Strategies for Better Listening) – Listening to Pre-Recorded video/audio (Listening to Famous Motivational Speeches)- Listening to Reading in the Class - for Vocabulary - for Complete Understanding – for Better Pronunciation(Read aloud a Story or an Article to Listen and Complete the Task) - Listening for General Content – Listening to fill up Information(Listening –fill in the Form Activity) – Intensive Listening for Specific Purpose-Listening to Monologues(Listening to Announcements) -Extensive Listening(Listening to Business News).		
UNIT III	**SPEAKING**	**5**
Defining Presentation and its Purpose; Audience & Local; Organizing Contents; Preparing Outline(Mini presentation)- Audio-Visual Aids; Nuances of Delivery; Body Language;(PPT Presentation) - Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice(Voice Modulation Practice)-Interviews &Its Types-Role Play(Mock Interview) -Group Discussion-Oral Presentations -Formal Conversations(Group Discussion Practice) .		
UNIT IV	**READING**	**5**
Reading & Its Types- Techniques for Good Comprehension, Reading Comprehension(Reading Comprehension Exercises) - Cloze Test ,Reading Newspaper- Editorials & Business Articles (Cloze Test Exercises)- Inferring Meaning- Improving Comprehension Skills(Reading for Meaning) - Skimming and Scanning– Structure of the Text – Structure of Paragraphs(Skimming and Scanning Exercises) - Interpreting Visual Communication(Graphs, Charts, Tables)(Interpreting the Graphical images).		
UNIT V	**WRITING**	**5**
Writing Official Letters(Invitation Letter (Accepting & Declining),Quotation, Ordering, Complaining, Seeking Clarification)(Business Letter Writing Exercises), Writing Official Letters(Permission – In-Plant Training)- Writing CV (Job Application)(Job Application Letter Exercise)- Essay Writing-Email Writing - Writing Reports & Proposal(Writing a Business Report)- Writing Circulars, Memos, Agenda & Minutes(Exercises on Writing Circulars, Memos, Agenda & Minutes).		
	LIST OF EXPERIMENTS	**16**
1. Videos on Stress Management (Stress Management Activities) 2. Videos on Team Spirit (Team Activities) 3. Listening to TED Talks(Listening to Business Interviews) 4. Listening to Business Presentation (Listening to Business Interviews) 5. Telephonic Conversation (Organizing a Meeting) 6. Product Launch (Persuasive Speech) 7. Business Conversations 8. Business Role Play Activities 9. Reading for Pleasure(Intensive Reading) 10. Extensive Reading(Briefing Favourite Self Help Books)		



11. Reading Newspaper articles(Reading Business Reports) 12. Reading Business Legends Success Formula(Read Between the Lines) 13. Writing an Advertisement (Writing Slogans for Products) 14. Error Correction Exercises (Formal Language expressions) 15. Business Vocabulary (Writing Official E-mails) 16. Writing Business Proposals (Writing Permission Letters)	
Text Book (s)	
1	Abirami K, "Professional English", First Edition, R.K.Publishers, Coimbatore, 2019.
Reference (s)	
1	LinaMuhkopadhyay, et al., "English for Jobseekers" ,Cambridge University Press, New Delhi,2013
2	Brook Hart Guy , Business Benchmark Advanced Personal Study Book for BEC and BULATS, Cambridge
3	Mascull , Bill. Business Vocabulary in Use, Third Edition, Nov 2017
4	Emerson Paul, Business English Handbook ,Advanced, Macmillan
5	www.Business English Site.com
6	www.businessenglishpod.com

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Regulation 2018		Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB102T	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	1	0	4

Prerequisite Course (s)

Calculus and Linear Algebra

Course Objective (s):

The purpose of learning this course is to:

1	Evaluate Double and triple Integral and apply them in problems in Engineering Industries
2	Evaluate Surface, Volume Integral and applications of Gauss theorem, Stoke's and Green's theorem in Engineering fields
3	To know the properties of Complex functions and apply them in all the Engineering fields
4	Evaluate improper integrals involving complex functions using Residue theorem and apply them in Engineering fields
5	Transform engineering problems into ODE, PDE and Integrals and solve them using Laplace / complex analytic methods

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Evaluate multiple integrals using change of variables
CO2	Apply techniques of vector calculus in problems involving Science and Engineering.
CO3	Apply complex analytic functions and its properties in solving problems
CO4	Evaluate improper integrals using Residue theorem involving problems in Science and Engineering
CO5	Apply techniques of Laplace Transforms and inverse transform for problems in Science and Engineering and Solving Ordinary Differential Equations

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	3	-	-	3	-	-	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	3	-	-	-
CO4	-	3	3	-	-	-	-	-	3	-	-	3	-	-	-
CO5	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO (Avg)	3	3	3	3	3				3	-	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	MULTIPLE INTEGRALS	9+3
Evaluation of double integration in cartesian and polar Coordinates - Evaluation of double integral by changing of order of integration - Area as a double integral (Cartesian and Polar) - Conversion from Cartesian to Polar in double integrals - Triple integration in Cartesian Coordinates - Volume as triple integral in Cartesian, Polar and Spherical Coordinates.		
UNIT II	**VECTOR CALCULUS**	**9+3**
Gradient,Divergence,Curl,Solenoidal,Irrotational fields - Directional derivative - Line integrals - Surface integrals - Volume Integrals - Green's theorem (excluding proof) :Applications in evaluating Line and Region - Gauss divergence theorem (excluding proof):Applications to cubes and parallelopipeds - Stoke's theorem (excluding proof):Applications to cubes and parallelopipeds.		
UNIT III	**ANALYTIC FUNCTION**	**9+3**
Definition of Analytic function – Cauchy Riemann equations- Properties of Analytic function - Determination of Analytic function using Milne's Thomson method-Conformal mapping (w=c+z, w=cz, w= $\frac{1}{z}$) - Bilinear transformation.		
UNIT IV	**COMPLEX INTEGRATION**	**9+3**
Cauchy's integral theorems (without proof) - Cauchy's integral formulae - Taylor's expansions with simple problems - Laurent's expansions with simple problems - Singularities - Poles and their types - Residues - Cauchy's residue theorem (without proof)- Contour integration: unit circle and semicircle.		
UNIT V	**LAPLACE TRANSFORMS**	**9+3**
Laplace Transforms of standard functions- Transforms properties- Transform of derivatives and integrals - Initial & Final value theorems (without proof) and Verification for some problems- Inverse laplace transforms using Partial fractions and Shifting theorem- Convolution theorem- Periodic functions- Solution of linear second order ODE equations with constant coefficients.		

Text Book (s)

1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008

Reference (s)

1	B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008
3	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
4	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002

Regulation 2018		SemesterI/Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18PYB101J	PHYSICS	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Identify the applications of electric field on materials
CLR-2	Identify the applications of magnetic field on materials
CLR-3	Identify the significance of quantum theory
CLR-4	Create insights to the concepts of optical effects
CLR-5	Analyze the working principle of lasers and optical fibers

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Identify the effect of charge dynamics
CO2	Analyze electromagnetic induction
CO3	Apply quantum mechanics to basic physical problems
CO4	Apply ray propagation and optical effects
CO5	Identify the applications of lasers and optical fiber

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTROSTATICS AND DIELECTRIC MATERIALS	9+3

Del-divergence-curl and gradient operations in vector calculus-Gauss-divergence and Stoke's theorem-Electric field and electrostatic potential for a charge distribution-Gauss' law and its applications-Laplace's equations for electrostatic potential-Poisson's equations for electrostatic potential-Solving Problems-Concepts of electric current-Continuity equation-Laws of magnetism-Faraday's law-Ampere's law-Maxwell's equations-Solving Problems-Polarizations, permeability and dielectric constant -Polar and non-polar dielectrics -Types of polarization-Frequency and temperature dependence-Internal field in a field-Clausius-Mossotti equation-Solving Problems.

UNIT II	MAGNETIC AND SUPERCONDUCTING MATERIALS	9+3

Magnetization, permeability and susceptibility-Classification of magnetic materials-Ferromagnetism-Concepts of ferromagnetic domains –Hysteresis-Solving Problems -Properties and applications of ferromagnetic materials -Hard and soft magnetic materials -Ferrimagnetic materials - Magnetic bubbles – Ferrites- Solving Problems-Superconductivity -Properties of superconductivity -Type I & Type II superconductors-High Tc superconductors – SQUID – CRYOTRON-MAG LEV-Solving Problems.

UNIT III	QUANTUM PHYSICS	9+3

Introduction to Quantum mechanics-Explanation of wave nature of particles-Black body radiation-Compton effect-Solving Problems-Photoelectric effect-de Broglie hypothesis for matter waves - Physical Significance of wave function -Time independent Schrödinger's wave equation -Time dependent Schrödinger's wave equation -Solving Problems-Particle in a 1 D box -Normalization - Born interpretation of wave function -Properties of Matter waves-Verification of matter waves-G.P. Thomson Experiment-Solving Problems.

UNIT IV	WAVE OPTICS	9+3

Introduction to interference-Introduction to diffraction-Fresnel diffraction-Fraunhofer diffraction-Fraunhofer diffraction at single slit-Fraunhofer diffraction at double slit-Solving Problems-Fraunhofer diffraction at multiple slit-Diffraction grating-Characteristics of diffraction grating-Applications of diffraction grating-Polarization by reflection-Polarization by double refraction-Solving Problems -Scattering of light-Circular polarization-Elliptical polarization-Optical activity-Fresnel's relation -Brewster's angle--Solving Problems.

UNIT V	LASER AND FIBER OPTICS	9+3

Absorption and emission processes-two level-Einstein's theory of matter radiation A and B coefficients-Characteristics of laser beams-Amplification of light by population inversion-Threshold population inversion-Essential components of laser system and pumping mechanisms-Solving Problems-Nd: YAG laser-Semiconductor laser-CO_2laser Vibrational modes- CO_2 laser-energy level-Optical fiber-physical structure-Total internal reflection-Solving Problems-Numerical aperture - Acceptance angle-Losses associated with optical fibers-Classification of optical fibers-Optical fiber communications system-Optical sensors-Solving Problems.

LIST OF EXPERIMENTS	30

1. Basics of experimentation
2. Determine dielectric constant of the sample
3. Calibrate Ammeter using Potentiometer
4. Calibrate voltmeter using Potentiometer
5. Determine the energy loss of magnetic materials using B-H curve experiment
6. Determine Planck's Constant
7. Study of I-V characteristics of a light dependent resistor (LDR)
8. Determine wavelength of monochromatic light by Newton's ring
9. Determine particle size using laser
10. Determine wavelength of using diffraction grating
11. Determine wavelength for a given laser source
12. Study of numerical aperture and acceptance angle of optical fiber
13. Mini project

Text books/ References:

1	David Jeffery Griffiths, Introduction to Electrodynamics, Revised edition, Pearson, 2013
2	Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th edition, 2012
3	David Halliday, Fundamentals of Physics, 7th edition, John Wiley & Sons Australia, Ltd, 2004
4	Berg and Resnick, Quantum Physics: Of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Edition, 1985

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Regulation 2018		Semester I /Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18CYB101J	CHEMISTRY	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- Apply the basic principles of chemistry at both atomic and molecular levels in understanding the concepts related to the engineering field.
- Integrate the chemical principles in their projects undertaken in their respective fields
- Enhance the quality of a materials used in the product from the technological aspects for societal applications

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Identify the suitable polymeric materials fabrication processes in various application
CO2	Apply the basic principle of inorganic chemistry at the atomic and molecular levels
CO3	Apply the various thermodynamic and kinetics concepts to real system
CO4	Assemble a battery through the understanding of electrochemical principles
CO5	Catagorize the Engineering materials for their applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ENGINEERING ORGANIC MATERIALS	9*+3*

Polymer – Introduction- classification(based on molecular weight, structure and usage)- types of polymerization(Addition, Condensation and Copolymerisation)-crystallinity, melting point and glass transition temperature-mechnism of polymerization(free radical addition polymerization)-elastomer- structure and curing(vulcanization)- Fabrication and molding of polymers(Injection molding and blow molding)- Engineering plastics – PE, PVC, PMMA, Phenol formaldehyde resin , urea formaldehyde resin(Preparation, properties and uses)- Industrial applications of polymers.

UNIT II	COORDINATION AND ORGANOMETALLIC COMPOUNDS	9*+3*

Co-ordination compounds – Introduction- nomenclature- types of ligands (mono, di and poly dendate ligands)- isomerism(structural and stereo isomerism) – theories of bonding(Werner and Sidgwick Pouvell theory(EAN rule)) – applications – EDTA titration – Organometallic compounds - synthesis(organo zinc, organo Lithium and Organo magnesium) – Applications (18 electron rule, Ziegler Natta Catalyst and Hydroformylation)

UNIT III	THERMODYNAMICS AND KINETICS	9*+3*

Introduction- first and second law of thermodynamics – Gibbs –Helmholtz equation Clausius clapeyron equation – Maxwell relations – Vant hoff isotherm and Isochore (problems also)- Kinetics- Introduction- types of reactions(opposing, consecutive and parallel reactions)- chain reactions (HBr and HCl formation)- Applications of kinetics and thermodynamics.

UNIT IV	ENGINEERING ELECTROCHEMISTRY	9*+3*

Introduction- Conductors and its types - cells (Electrolytic and Electrochemical cells) – Standard electrode potential- Nernst equation of an electrode- types of electrodes (SHE and Calomal electrode)- Batteries –Types (Primary, Secondary, Flow and reserve battery)- Examples (Lead acid battery, Ni-Cd battery, Lithium battery, Lithium sulphur battery and Hydrogen- Oxygen fuel cells)- Graphene.

UNIT V	INDUSTRIAL APPLICATIONS OF CHEMISTRY	9*+3*

Cement (Types, manufacture and properties) – Paints (constitutions and functions)- Lubricants- types- mechanism – properties-abrasives – types –Diamond, Corundum, emery, garnet, quartz, Silicon carbide, carborundum-boron carbide, alundum (preparation, properties and uses) –applications – Basics of biosensor and biochips.

LIST OF EXPERIMENTS	30

1. Determination of total , permanent and temporary hardness of water sample (EDTA method)
2. Determination of alkalinity in water sample- Indicator method
3. Determination of chloride content of water sample by Argentometric method(Mohr's method)
4. Determination of dissolved oxygen content of water sample by winkler's method
5. Conductometric titration of strong acid with strong base
6. Conductometric titration of mixture of acids

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7. Determination of strength and amount of Hydrochloric acid- pH metry 8. Estimation of strength and amount of ferrous ion by potentiometric method 9. Determination of molecular weight of a polymer by viscometry method 10. Estimation of ferrous ion by colorimetry. 11. Cement analysis

Text / Reference (s) books:	
1	B.L.Tembe, Kamaluddin and M.S.Krishnan , "Engineering chemistry"
2	S.S. Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd, New Delhi (2009).
3	P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., NewDelhi (2012).
4	Shashi Chawla, Engineering Chemistry: Dhanpat Rai &Co., 3rd Edition, 2015
5	www.nptel.ac.in

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Regulation 2018		Semester I /Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES101J	ENGINEERING GRAPHICS (COMPUTER SCIENCE)	1	0	4	3

Course Objective (s):

1. Construct ellipse, Parabola, hyperbola, cycloid and involutes.
2. Sketch the projection of points, straight lines and plane surfaces.
3. Sketch the Projection of simple solids like prisms, pyramids, cylinder and cone
4. Sketch the sectional solids and developing the lateral surfaces of simple solids
5. Understand the three dimensional drawing of simple solid by isometric projection and perspective projection, and convert isometric projection to orthographic projection.

Course Outcome (s) (COs):

CO1	Apply engineering graphic fundamentals to draw/evaluate engineering curves.
CO2	Draw the graphics of engineering parts with point, line and plane projections
CO3	Draw projection of solid objects like prisms, cylinders, pyramids and cones used in engineering objects
CO4	Develop the lateral surfaces of the sectional solids.
CO5	Create 3D part models using isometric and perspective projection.

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO3
CO1	3	2	2	2	2	-	2	3	2	2	-	3	-	-	-
CO2	3	2	3	2	2	-	1	2	3	2	-	3	2	1	-
CO3	3	2	3	2	3	-	1	2	3	2	-	2	1	1	-
CO4	3	2	3	2	3	-	1	2	3	2	-	2	1	1	-
CO5	3	2	2	2	2	-	1	2	2	2	-	3	1	1	-
CO (Avg)	3	2	2.6	2	2.4	-	1.2	2.2	2.6	2	-	2.6	1.25	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	PLANE CURVES	9
Principles of Engineering Graphics - Lettering - dimensioning - Curves used in engineering practices: Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes – Drawing of tangents and normal to the above curves.		
UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACES	9
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations. Projection of polygonal surface and circular lamina inclined to both reference planes.		
UNIT III	PROJECTION OF SOLIDS	9
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.		
UNIT IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	9
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.		
UNIT V	ISOMETRIC PERSPECTIVE AND ORTHOGRAPHICS PROJECTIONS	9
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method. Isometric to orthographic multi-view.		

Text Book (s)	
1	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2010).
2	K. Venugopal& V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 15th edition (2018).
Reference (s)	
1	1. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications, 2010.
2	2. R. L Jhala "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2015.
3	3. DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.
4	4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
5	5. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2009.

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List of Expertiments.

1	Spiral and involutes using bspline or cubic spline
2	Plan of residential building
3	Simple steel truss
4	Isometric projection of simple objects
5	Creation of 3D model
6	Orthographic projection of given 3D object
7	Projection of planes with inclination to reference plane
8	Solids with inclination to one reference plane
9	Section view of simple solids
10	Development of solids

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Regulation 2018		Semester I / Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J(R)	PROGRAMMING FOR PROBLEM SOLVING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	Learn programming using a structured programming language
CO2	Provide exposure on C programming.
CO3	Introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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25 MAR 2019

UNIT I	INTRODUCTION	6
Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems– Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.		
UNIT II	C PROGRAMMING BASICS	6
Structure of a 'C' program – Tokens – Data Types – Operators –Input and Output operations – Decision Making and Branching – Looping statements.		
UNIT III	ARRAYS AND STRINGS	6
Arrays: Declaration – Initialization – One dimensional and Two dimensional arrays – String: String Declaration and Initialization- String Functions.		
UNIT IV	STRUCTURES AND POINTERS	8
Introduction to Structures-Need for Structure Data type – Structure: Definition, Declaration – Structure vs Union. Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays –Null Pointer – Pointer to Structures.		
UNIT V	FUNCTIONS	4
Function - Definition of function – Declaration of function – Function Prototype – Pass by value – Pass by reference.		
LIST OF EXPERIMENTS		15

1. Programs on Operators
2. Programs on Control statements
3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array
5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Pointers
9. Programs on Structures
10. Programs on Union

Text Book (s)

1	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2	PradipDey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009

Reference (s)

1	Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
2	Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
3	Kernighan.B.W and Ritchie.D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
4	Yashavant P. Kanetkar, "Let Us C", BPB Publications, 2011.

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Regulation 2018		Semester I / Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J	PROGRAMMING FOR PROBLEM SOLVING	1	0	4	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	To learn programming using a structured programming language
CO2	To provide exposure on C programming.
C03	To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO C	9

Evolution of Programming & Languages - Problem solving through programming - Creating algorithms - Drawing flowcharts - Writing pseudocode - Evolution of C language, its usage history - Input and output functions: Printf and scanf - Variables and identifiers - Expressions, Constants - Keyword ,Single line and multiline comments- Values, Names, Scope - Binding, Storage Classes - Input and Output Statement - Numeric Data types - Non-Numeric Data types: char string - Non-Numeric Data types: string - Increment operator - decrement operator - Comma, Arrow and Assignment operator - Sizeof operator - Bitwise operators - Relational Operators - logical Operators - Conditional Operators - Operator Precedence

UNIT II	CONTROL STATEMENT AND ARRAY	9

If statement in expression - L value and R value in expression - Control Statements – if and else – else if – nested if - switch case - Iterations – While loop - do..While loop - For loop - Goto, break, continue - Array Basic and Types - Array Initialization and Declaration - Initialization: one Dimensional Array, Accessing - Indexing one Dimensional Array Operations - Initializing and Accessing 2D Array - Initializing Multidimensional Array - Array Advantages and Limitations

UNIT III	STRINGS AND FUNCTIONS	9

String Basics - String Declaration and Initialization - String Functions: gets(), puts(), getchar() - putchar(), printf()atoi(), strlen()strcat(), strcmp()sprint(), sscanf()strcpy(), strstr()Strrev(), strtok()Functions basics - Functions declaration and definition - Types: Call by Value - Call by Reference - Function with Arguments and no Return Values - Function without Arguments and no Return Values - Function with Arguments and Return Values - Function without Arguments and Return Values - Passing Array to Functions - Returning array from functions - Formal and Actual Parameters - Recursion Functions - Advantages of using Functions

UNIT IV	POINTERS	9

Pointers Basics - Address operator - Pointer Declaration - dereferencing pointers - Size of Pointer Variable and Pointer Operator - Void Pointers and size of Void Pointers - Arithmetic Operations - Incrementing Pointers - Constant Pointers - Null Pointers - Pointers to array elements - Pointers to strings - Function Pointers

UNIT V	STRUCTURES AND UNIONS	9

Structure basics & declaration - Initializing Structure, Accessing members - Nested structure - Array of structure - Accessing elements in a structure array - Passing Array of structure to function - Union Basic and declaration - Accessing Union Members - file: opening, defining - File closing, File Modes, File Types - Writing contents into a file - Reading file contents - Appending an existing file - File permissions and rights - Changing permissions and rights

LIST OF EXPERIMENTS	15

1. Programs on Operators
2. Programs on Control statements
3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array
5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Function prototypes
9. Programs on Passing and returning Array to Functions

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10. Programs on Recursion Functions 11. Programs on Pointers 12. Programs on Structure 13. Programs on Union 14. Programs on Files	
Text Book (s)	
1	Zed A Shaw, Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C), Addison Wesley, 2015
2	Bharat Kinariwala, TepDobry, Programming in C, eBook
3	W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd ed. Prentice Hall, 1996

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Regulation 2018		Semester I / II	Total 3ours			75
Category	Course Code	Course Name	3ours / Week			C
			L	T	P	
S	18MES102J	BASIC CIVIL AND MECHANICAL ENGINEERING (CSE)	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

- Select building materials and identify the components of a building
- Identify the various transportation systems, bridges, dams and water supply system
- Apply the concept of Harnessing energy from various energy sources
- Know the working of IC engines and identify the sub system requirements
- Apply manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

Course Outcome (s) (COs):

CO1	Identify the building materials and its applications
CO2	Identify different transportation system, water supply system and its applications
CO3	List the basic components and analyze the working of major power plants
CO4	Identify the working of IC engines and understand the need of various auxiliary systems
CO5	Identify manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	-	3	3	-	-	-	-	3	-	-
CO2	3	-	3	-	3	3	3	-	3	-	-	3	-	-
CO3	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	3	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3		3		3	3	3		3			3		

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UNIT I	BUILDING MATERIALS	9

Introduction to Civil Engineering, Building Materials, History, Disciplines in Civil Engineering, Early constructions and development over time, Ancient Monuments: Peruvudaiyar or Brihadeeswarar Temple, Kallanai dam Grand Anicut, Taj Mahal, Golconda fort, Angkor Wat, Pyramids of Giza, Colosseum Development of various materials, Methods of Construction, Building Materials - Stone – Classification of Rocks, Quarrying, Dressing, Properties and Uses of Stone Mortar, Plain and Reinforced Cement, Concrete Grade and properties and uses, Necessity of Special Concrete, Self Compacting Concrete, Construction Chemicals (Plasticizers), Recycling: construction, demolition wastes, Buildings, Classification of Buildings, Selection of site for a building, Components of Buildings, Soil, General types of soil, Bearing Capacity, Factors affecting bearing capacity, Foundations: Functions, General types of, foundation, Shallow foundations

UNIT II	TRANSPORTATION AND WATER SYSTEM	9

Cement concrete flooring, Marble flooring, Granite flooring, Ceramic tile flooring, Roofs: Types of roofs, Madras terrace roof, Reinforced concrete roofs, Trussed roof, Roof Coverings: Types, Weathering course: Types, Mode of Transportation - Highways - Classification of Roads, Cross section details of flexible pavements, Railways – Zone and Headquarters, Permanent way and its requirement, Components of Permanent way, Bridges: Components of Bridge, Types, Dams: Purpose, Classification, Gravity dams - Advantages and Disadvantages, Elements of protected Water Supply system, Objective, Quantity of water, Design period, Per-capita demand, Factor affecting per capita demand, Sources of Water Supply, Standards of Drinking water, Drinking Water Treatment: Objectives, Treatment plant process, Sewage: Method of collection, Sewage treatment and disposal

UNIT III	POWER PLANTS	9

Coal based thermal Power Plant: layout, components description,working, advantages, disadvantages, Hydro Electric power plant: layout, components description, working, advantages and disadvantages, Nuclear power plant: Nuclear fission and fusion reactions, Nuclear reactor, components description, Layout, working, merits and demerits of boiling water reactor , Layout, working, merits and demerits of pressurized water reactor, Gas turbine power plants:componentsdescription,working and types gas turbines, methods to improve performance, Layout and working of open cycle plant with intercooling, reheating, regeneration, Solar Thermal power plant: layout of Flat plate collector based plant, central receiver type plant, advantages, disadvantages, Wind energy conversion system – wind turbine types, Working, advantages and disadvantages, Ocean Thermal Energy Conversion system: layout of open cycle , Layout of closed cycle, advantages, disadvantages

UNIT IV	INTERNAL COMBUSTION ENGINES	9

Engine: Classification,operations of 2 stroke & 4 stroke, Comparison of SI & CI engines, Fuel supply system and Battery ignition system, Magneto ignition system of SI engine, Working of a simple carburetor, GDI, MPFI, CRDI, Lubrication system of an engine, Functions and Working of mist and forced feed lubrication system, Cooling system of an engine – Working of air cooled (fins), Water cooled engines (forced circulation), Alternate fuels for IC Engines. Liquid fuels: methanol, ethanol, vegetable oil, Biodiesel, Gaseous fuel: Hydrogen, CNG, LPG, properties, advantages, disadvantages, Emissions from engine – Emission standards – Euro, BS, Emission control measures – Catalytic converter, Exhaust gas recirculation, Introduction to electric vehicles, Hybrid and autonomous vehicles

UNIT V	CASTING AND FORMING PROCESS	9

Casting introduction and history, Expandable mold casting process , Production steps in a typical sand-casting process, terms including patterns and core, Other expendable mold casting: shell molding, vacuum molding, expanded polystyrene process, Investment casting, Permanent mold casting: hot chamber and cold chamber

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die casting & Permanent mold casting:Semi centrifugal and centrifuge casting, Metal forming introduction and its classification, metals and alloys,Bulk deformation: hot, cold forging processes, hot rolling processes,cold rolling processes, Rolling mill classification, hot and cold extrusion processes, wire and bar drawing processes, Sheet metal working, applications. Cutting operations: shearing, blanking, punching, cutoff, parting, slotting, perforating, notching, trimming, shaving, fine blanking, Bending operations: V-bending, edge bending, flanging, hemming,seaming, curling, spring back effect, Drawing operations, its defects, coining, embossing, ironing, lancing, twisting	
Text Book (s)	
1	Dr.V.Rameshbabu,"Basic Civil and Mechanical Engineering", VRB Publishers pvt ltd, 2017
Reference (s)	
1	SeropeKalpakjian, Steven Schmid," Manufacturing Processes for Engineering Materials", Pearson, 2016
2	Dirbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, "Power Plant Engineering", Kluwer Academic Pub., 1995
3	Andy Walker, "Solar Energy", John Wiley & Sons, 2013
4	John B. Heywood, "Internal Combustion Engine Fundamentals", Tata McGraw Hill Education, 2017
5	Kumar. T, LeenusJesu Martin and Murali. G, "Basic Mechanical Engineering", Suma Publications, Chennai, 2007.

LIST OF EXPERIMENTS

Total: 30hours

1.	Study of wood types, carpentry tools, operations and safety precautions.
2.	To make various carpentry joints like T-joint, lap joint, bridle joint, mortise tenon joint and etc.
3.	Study of pipeline joints, its location and functions in household fittings.
4.	Preparation of single tap, multi tap and shower connection by using GI and PVC pipes.
5.	Study about basics of fitting process, tools and method of producing models.
6.	Preparation of square, half round, step, V, T fitting of two metals by using fitting tools.
7.	Study of cutting, bending operations and tools used in sheet metal processes.
8.	To make trays, cone and funnel by using sheet metal operations.
9.	Study of welding types, tools, equipments and welded joints.
10.	Preparation of butt joints, lap joints and T-joints by shielded metal arc welding.
11.	Study about the types, properties and uses of brick, stone and cement.
12.	Study about water supply, distribution System, water treatment plant, sewage system
13.	Study about the basics of casting processes and equipments.

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Regulation 2018		Semester - I / Semester - II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18EES101J(R)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

NIL

Course Objective (s): The purpose of learning this course is to:

1	Gain the knowledge about D.C and A.C circuits.
2	Impart the fundamentals of electrical machines.
3	Study the fundamentals of semiconductor devices
4	Study the working concepts of measuring instruments.
5	Know about digital logic concepts and operational amplifier.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Apply the concepts of ohm's law and Kirchhoff's law in DC and AC circuits
CO2	Explain the basic concepts of DC motor, DC generator, Transformer and Induction motor.
CO3	Summarize the nature of semiconductor devices.
CO4	Interpret the concept of measuring devices like PMMC, MI, energy meter and wattmeter.
CO5	Infer the concept of electronics devices and conversion techniques

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1
CO2	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO3	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO4	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO5	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO (Avg)	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTRICAL CIRCUITS	9

Electrical quantities: Resistors, Inductors, Capacitors - Ohm's Law - Kirchoff's Laws -Series and Parallel circuits - Analysis of DC circuits: Mesh & Nodal analysis, Thevenin's Theorem, Norton's Theorem & Maximum Power Transfer Theorem, Star delta Transformation, RL & RC Transient Analysis. Introduction to AC Circuits: Waveforms and RMS Value – Power and Power factor- Introduction to three phase systems – Types of connections, Relationship between line and phase values.

UNIT II	ELECTRICAL MACHINES	9

Faraday's laws- Construction, Principle of Operation, Basic Equations of DC Generators, DC Motors – Two Point & Three Point Starter – Construction, Working and EMF Equation of Single Phase Transformer – Construction and Working of AC Generator – Three Phase Induction Motor: Construction and Working of Squirrel Cage and Slip Ring Induction Motor – Single Phase Induction Motor (Split Phase, Capacitor Start Induction Motor).

UNIT III	ELECTRONIC DEVICES	9

Intrinsic and Extrinsic Semiconductors – PN junction diode , Zener diode and its Characteristics – Operation of Half Wave, Full Wave and Bridge Type Rectifiers – Bipolar Junction Transistor: Configurations and Characteristics of CB, CE, CC – Construction and Operation of JFET, MOSFET.

UNIT IV	MEASUREMENTS	9

Basic Principles and Classification of Instruments – Construction and Working of PMMC, MI Instruments (Attraction & Repulsion type) – Principle of Operation of Dynamometer Type Wattmeter, Induction Type Energy Meter – Instrument transformer – CRO – Megger.

UNIT V	DIGITAL & INTEGRATED CIRCUITS	9

Number Systems – Boolean Theorems– Logic Gates – Half Adder and Full Adder Circuit – Flip-Flops: RS, JK, T and D – A/D Converter (Successive Approximation Type) – D/A Converter (Binary Weighted Type) – Op-Amp : Functional Block and Types (Inverting , Non-Inverting & Differential Amplifier).

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Electrical and Electronics Engineering Approved On 15 OCT 2020 Board of Studies KARUR - 639 113

LIST OF EXPERIMENTS	15

1. Verification of Ohm's & Kirchoff's Laws
2. Types of Wiring (Fluorescent Lamp & Staircase)
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Characteristics of PN Junction Diode
6. Characteristics of Common Base Configuration.
7. Characteristics of Common Emitter Configuration.
8. Measurement of Ripple Factor: Half Wave & Full Wave Rectifier.
9. Study of AC and DC Machines
10. Verification of Logic Gates
11. Study of PMMC and MI Meters

Text Book (s)

1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering," Tata McGraw-Hill, 2012
2	Sawhney, A.K., "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2011.

Reference (s)

1	Dash.S.S, Subramani.C, Vijayakumar.K, "Basic Electrical Engineering", Vijay Nicole, 1st Edition, 2013.
2	Jegatheesan.R, "Analysis of Electric Circuits", Tata McGraw-Hill, 2014.
3	Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd Edition, 2010.

Regulation 2018		Semester I/ Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18EES101J	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Analyze given electric circuits consisting of active and passive components.
2	Identify the parts, functions and working of motors, generators and transformers that function in AC and DC.
3	Utilize the basic electronic devices and circuits.
4	Utilize the working concept of measuring instruments.
5	Build simple logical circuits using Boolean expressions. Identify elements in Integrated circuit.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss basic theory utilized in electrical circuits and its circuits.
CO2	Describing working principle of direct current and alternative current machines such as transformers, motors and generators.
CO3	Operate the basic electronic devices. Identify their uses and construction features.
CO4	Interpret the concept of measuring devices like PMMC, MI ,energy and wattmeter.
CO5	Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a Integrated circuit.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO2	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO3	3	-	1	1	2	-	2	2	2	2	-	2	-	-	-
CO4	3	-	1	1	1	-	2	2	2	2	-	2	-	-	-
CO5	3	2	2	2	2	-	2	2	2	2	-	2	-	-	-
CO (Avg)	3	2	1.2	1.2	1.8	-	2	2	2	2	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTRICAL CIRCUITS	12

Introduction to DC and AC circuits, Active and Passive two terminal elements, Ohms law,Voltage-Current relation, Power, Energy, R,L,C Circuits, Voltage and Current Sources, Kirchoff's current law, Kirchoff's voltage law, Problem Solving Session, Mesh Current Analysis, Nodal Voltage Analysis, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Star- Delta Transformation, Problem Solving Session, Resistive Circuit Analysis, Superposition, Convolution, RL Circuit Transient Analysis, RC & RLC Transient Analysis , Three Phase Systems, Star and delta Connections, Relation between Line and, Phase, Problem Solving Session.

UNIT II	DC MACHINES & AC MACHINES	12

Sinusoids, Generation of AC, Average, RMS values, Form and peak factors, Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor, Magnetic materials, B-H Characteristics Simple magnetic circuits, Faraday's laws, induced emf and inductances. 1 - Phase transformers: Construction, types, ideal, practical transformer, EMF equation, Regulation, Efficiency, Problem Solving Session, Construction, working of DC Generators, Types of DC generators, Characteristics of Generators, Applications of DC generator, Working and types of DC motors, Characteristics , Two point starter and Three point starter, Problem Solving Session, AC generators (Alternators), Construction, working, Characteristics of Alternators, Losses, Single Phase motors: Split phase induction motor & Capacitor start Induction motor, Working and types of single phase AC motors, Squirrel Cage and Slip ring induction motor, Types of AC starters (Autotransformer, star-delta and Rotor resistance starter), Problem Solving Session.

UNIT III	ELECTRONIC DEVICES	12

Overview of semiconductors, Intrinsic and Extrinsic semiconductors, Operation of PN Junction diode , Characteristics of PN Diode, Operation of Zener diode, Characteristics of Zener Diode, Overview of diode circuits, Operation of Half-wave rectifier, Half wave : Ripple factor Expression, Advantages, Disadvantages, Operation of Full-wave rectifier, Full wave : Ripple factor Expression, Advantages, Disadvantages, Bridge type rectifier operation, Comparison of rectifier circuits, Overview of filters and its uses, BJT construction, operation, BJT characteristics (CB, CE and CC configurations) and uses, JFET construction, operation, JFET characteristics (Drain and Transfer characteristics), Depletion mode and Enhancement mode MOSFET construction operation, MOSFET characteristics (Transfer and output characteristics), Problem Solving Session.

UNIT IV	MEASUREMENTS	12

Methods of measurements – Overview, Types of Measurements: Primary, Secondary, Tertiary, Basic principles and Classification of Instruments- Indicating, Recording and Integrating, Construction and working of PMMC, PMMC-Torque Equation, Advantages, Disadvantages, Construction and working of MI Instruments, MI (Attraction type)-Operation, MI Attraction type-Advantages , Disadvantages, MI (Repulsion type)- Operation, Torque Equation, MI (Repulsion type)- Errors, Advantages, Disadvantages, Overview of Instrument Transformers, Current Transformer, Potential Transformer, CRO, CRT, Operation of Dynamometer type watt meter, Advantages and Disadvantages, Operation of Induction type watt meter, Advantages and Disadvantages, Megger –Construction, Working, Measurement of Earth resistance

UNIT V	DIGITAL AND INTEGRATED DEVICES	12

Number systems, binary codes, Binary arithmetic, Boolean algebra, laws and theorems, Simplification of Boolean expression, Logic Gates and Operations, Simplification of Boolean expression, Problem Solving Session, SOP and POS Expressions, Standard forms of Boolean expression, Simplify using Boolean Expressions, Minterm and Maxterm, K-Map Simple Reduction Technique, Two, Three and Four Variable K-Map, Problem Solving Session, Half adder circuit, Full adder circuit, Flip-flops : RS , JK, T and D Flip-flops, A/D Converter-Successive Approximation , D/A Converter-Binary Weighted, Overview of Op-Amp, Op-Amp : Functional block & Types (Inverting, Non-inverting & differential amplifier).

LIST OF EXPERIMENTS	30

1. Verification of Kirchoff's Law
2. Verification of all Theorems,
3. Time Domain Analysis (RL, RC).

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4. Types of wiring (Flourescent lamp,Staircase ,godown wiring). 5. Demo of DC Machine & Parts 6. Demo of AC Machine & Parts. 7. Characteristics of semiconductors 8. Measurement of Ripple factor (Half-wave and Full-wave). 9. Characteristics of CB and CE configurations 10. Demo of PMMC and MI Meters, 11. Waveform verification using CRO, 12. Measurement of Energy using Single phase Energy meter. 13. Verification of Boolean expression using logic gates. 14. Reduction using Digital Logic Gates. 15. Design and test of Inverting and Non-Inverting Amplifier using IC741	
Text Book (s)	
1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012
Reference (s)	
1	Dash.S.S, Subramani.C. Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013.
2	Jegatheesan.R,Analysis of Electric Circuits, Tata McGraw-Hill; 2014.
3	P. S.Bimbhra ,Electrical Machinery,7th ed,. Khanna Publishers, 2011.
4	Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011.
5	Sawhney A.K., A Course in Electrical & Electronic measurements and Instrumentation,Dhanpat Rai and Co,2011.

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Regulation 2018		Semester I/Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH101L	PROFESSIONAL SKILLS AND PRACTICES	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Equip students with different aspects of Presentation
CLR-2	Train students to use appropriate language for publics peaking.
CLR-3	Help students better understand basic leadership qualities and personality traits
CLR-4	Train the students to face interview confidently.
CLR-5	Make students understand how setting goals in life is important.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Make presentation in a formal way.
CO2	Speak with clarity and confidence, thereby enhancing their employability skills.
CO3	Enable students to understand different aspects of leadership and evaluate in their own strengths.
CO4	Clear the job interview successfully.
CO5	Realize that selecting goal is a fundamental component to long- term success of an individual.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO2	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO3	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO(Avg)	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PRESENTATIONS	5
Tips and Techniques for an Effective Presentation - Effective presentation structure - Types of Presentation - Verbal aspect of a presentation - Non-verbal aspect of a presentation – body language - Stress management during a presentation		
UNIT II	**PUBLIC SPEAKING**	**5**
Importance of Public Speech - Dealing with fear and Anxiety - Tips and Techniques for Public Speaking - Informative Speech - Delivering a Persuasive Speech - Dealing with audience questions		
UNIT III	**LEADERSHIP SKILLS**	**5**
Communication – Motivation – Delegating – Creativity – Responsibility - Commitment		
UNIT IV	**INTERVIEW SKILLS**	**5**
Preparing for a Job Interview - The Interview Process - Telephone Interviews - Interview Techniques - Mock Interview - Mock Interview		
UNIT V	**GOAL SETTING**	**5**
Types of goals - Reasons for goal setting - Goal Setting Process - S.M.A.R.T. goals - Tips and Techniques for Goal Setting - Trouble in Setting Goals		
LIST OF EXPERIMENTS		**5**

1. Make a presentation on a general topic
2. Give a persuasive speech
3. Exhibit your leadership qualities
4. Mock interview
5. Share your realistic short term and long term goals and the ways to attain them.

Text Book (s)

	NIL

Reference(s)

1	Aruna Koneru, Professional Communication, Tata McGraw-Hill Publishing Company Limited, New Delhi
2	Professional Skills and Practice, Oxford University Press
3	https://www.skillsyouneed.com
4	https://www.Business English Site.com

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Regulation 2018		Semester I/ Semester II	Total Hours			30
ıtegory	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH102L	GENERAL APTITUDE	0	0	2	1

erequisite Course (s)

-l

urse Objective (s):

e purpose of learning this course is to:

R1	Recapitulate fundamental mathematical concepts and skills
R2	Hone critical thinking skills by analyzing the arguments with explicit and implicit premises
R3	Sharpen logical reasoning through skillful conceptualization
R4	Identify the relationships between words based on their function, usage and characteristics
R5	Nurture passion for enriching vocabulary
R6	Acquire the right knowledge, skill and aptitude to face any competitive examination.

ırse Outcome (s) (COs):

he end of this course, learners will be able to:

01	Build a strong base in the fundamental mathematical concepts
02	Identify the approaches and strategies to solve problems with speed and accuracy
03	Gain appropriate skills to succeed in preliminary selection process for recruitment
04	Collectively solve problems in teams and groups
05	Build vocabulary through methodical approaches
06	Enhance lexical skills through systematic application of concepts and careful analysis of style, syntax, semantics and logic

-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO2	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO3	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO4	1	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO5	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO6	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
(Avg)	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-

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1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

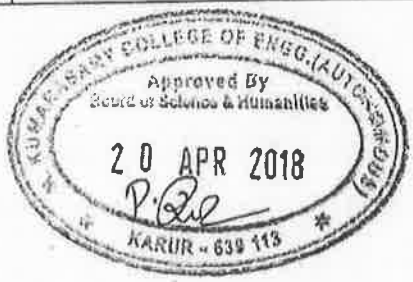
UNIT I		6
Types of numbers, Divisibility tests -Introduction to Significance of Verbal Aptitude in Competitive Examinations - LCM and GCD -Vocabulary enrichment techniques - Unit digit, Number of zeroes, Factorial notation - Vocabulary enrichment Techniques.		
UNIT II		6
Square root, Cube roots, Remainder - Identities - Contextual Vocabulary Exercise - Synonyms Fractions and Decimals, surds -Contextual Vocabulary Exercise -Antonyms		
UNIT III		6
Percentage Introduction - Sentence Completion Basic Level Exercises : Single Blank - Percentage Problems - Sentence Completion Basic Level Exercises : Double Blank - Profit and Loss - Cloze Test		
UNIT IV		6
Discount -Reading Comprehension – Introduction -Simple Interest - Reading Comprehension – Summary & Main Idea - Compound Interest, Installments - Reading Comprehension – Summary & Main Idea		
UNIT V		6
Logarithms Intro - Grammar Rules :A comprehensive Introduction - Logarithms Rules - Sentence Completion – Grammar - Linear Equations - Spotting Errors		

Text Book (s)

1	Nil

Reference (s)

1	Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002
2	Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010
3	Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition
4	Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014
5	Wiley's GMAT Reading Comprehension Grail, Wiley, 2016
6	Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition
7	Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013
8	Nishit K. Sinha, The Pearson Guide to Quantitative Aptitude and Data Interpretation for the CAT
9	Dinesh Khattar-The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations



Regulation 2018		Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM102T	VALUE EDUCATION	1	0	0	-

rerequisite Course (s)

L

urse Objective (s):

ıe purpose of learning this course is to:

R-1	Connect the learners to their potential, identify their potential to create a new positive world
R-2	Analyze the merits and demerits of different educational systems. Identify the different systems of education
R-3	Draw attention towards the weaknesses they are susceptible to and inspire them through positive models
R-4	Instill a sense of professional ethics which help them develop a safe comfortable and prosperous society
R-5	Cultivate a spirit of willing accommodation in an increasingly diverse world

urse Outcome (s) (COs):

the end of this course, learners will be able to:

1	Equipped with an awareness of their positive energy and power
2	Identify the meaning of 'education'; have a clearer and better understanding in taking education to the masses
3	Assess their weaknesses; understand risks involved and rectify them through learning from positive and negative instances
4	Realize their professional responsibilities
5	Acquire the required values in an expanding pluralistic world not be swept off their feet due to the rapid changes

-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	3	-	3	3	3	-	3	-	-	-
CO2	2	3	2	-	3	3	2	2	3	3	-	3	-	-	-
CO3	2	-	-	-	2	3	2	2	3	3	-	3	-	-	-
CO4	3	2	-	-	3	3	3	3	3	3	-	3	-	-	-
CO5	2	-	-	-	3	3	3	3	3	3	-	3	-	-	-
(Avg)	2	2.33	2	-	2.6	3	2.5	2.6	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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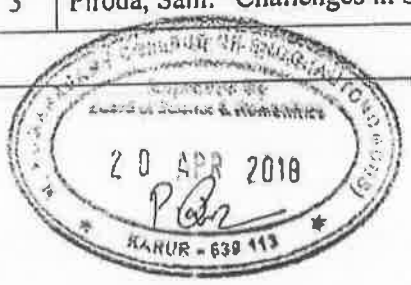
UNIT I	VISIONS FOR YOUTH	6
Introduction (Quiz) - Two speeches by great personalities (Oral presentations) - Quotes, proverbs relating to the power and potential of youth, Excerpts: Wings of Fire (Collecting proverbs highlighting the potential of youth) - Two news articles highlighting the initiatives for social causes by youth (Role play in a similar context) - One song exhibiting the positive energy of youth (Discussion on the song)		
UNIT II	YOUTH AND EDUCATION	6
Meaning and the significance of education (Brainstorming) - Overview of different (traditional, modern) educational systems (Debate) - Role of youth in education, Urban and Rural set up, dissemination (Student presentations) - Designing and framing educational curriculum and materials (Students' Presentation based on write ups) -The pressing challenges in current educational system (Collage Design)		
UNIT III	YOUTH AND SOCIETY	6
Need for social values in the present context (Poem – "Where the mind is without fear", Write up on various instances from real life) - Individual and group behaviour, respect for others (Case study on recent happenings) - Civic sense, bullying-substance abuse, uses of expletives (Case study on recent happenings) - Hero worship, gender insensitivity moral policing (Case study on recent happenings) - Positive contribution by youth in promoting social welfare (Short videos followed by discussions)		
UNIT IV	YOUTH AS PROFESSIONALS	6
Introduction to professional values (Brainstorming through visual cues) - Engineering societies in India (Quiz) - Challenges to be addressed by Engineers in India (Case Study) - Challenges in different sectors: agriculture (Case Study) - Challenges in different sectors: urban development, environment (Group activity (oral and written)) - Challenges in different sectors: sustainable development, cyber security (Case Study – from Newspapers)		
UNIT V	YOUTH IN PLURALISTIC SOCIETY	6
Introduction to pluralistic society, forces of globalization (Group Discussion) - Science and technology intercultural proximity (Narration of stories from various religions to illustrate the oneness of humanity) - Positive, Negative impact: religion, politics, gender, economic status, aesthetics (Discussion on "To Kill a Mocking Bird") - Values required to live in a global society (Poster presentation on festivals of various religions) - Learning the etiquettes of various societies (Poster presentation on festivals of various religions) - Success of pluralistic society, enliven the society, religious harmony through literary (Writing the aspects of pluralistic society based on the text).		

Text Book (s)

	Nil

Reference (s)

1	Kalam, APJ Abdul. Wings of Fire: AN Autobiography of APJ Abdul Kalam. Ed. Sangam Books Ltd., 1999
2	"Banaras Hindu University Speech" and "To Students". The Voice of Truth. General Editor Shriman Narayan. Navajivan Publishing House. pp. 3-13 and pp. 425-30. www.mkgandhi.org
3	Piroda, Sam. "Challenges in Science and Technology". www.nfdindia.org/loc19.htm



4	Thomas A Address to VTU Students by Narayana Murthy. https://www.karnataka.com/personalities/narayana-murthy/vtu-address-2006/
5	World Economic forum. "India's top 7 challenges from skills to water scarcity"

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Regulation 2018		Semester I&II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18GNM101L	Physical and Mental Health using Yoga	0	0	2	0

Prerequisite Course (s) Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	provide deeper insight into the curriculum of Yogic Sciences along with the practical applications of Yoga
CLR-2	intend that students should get familiar with the poses of Yogasanam.
CLR-3	Promote positive health in the Student through Yoga and enabling and imparting skill in them to practice and apply Yogic
CLR-4	practice for Health to general public and teach Yoga for Total personality development and spiritual evolution.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	increase the muscle strength
CO2	improve respiration, energy and vitality.
CO3	maintain a balanced metabolism and weight reduction.
CO4	maintain cardio and circulatory health.
CO5	improve athletic performance and protection from injury.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-

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	Introduction:	**6**
	▪ Human Body- Meaning and its Importance in Yoga ▪ Definition of Anatomy and Physiology ▪ Cell: Structure & Function	
	General information, Different parts, Structure, Function and Effect of Yogic Practices.	**24**
	▪ Tissues: Types, Structure & Function. ▪ Musculo-Skeletal System ▪ Digestive system ▪ Excretory system ▪ Respiratory system ▪ Circulatory system ▪ Nervous System ▪ Endocrinal system	

Text / Reference (s) books:

1.	Shirley Telles - A Glimpse of the Human Body The structure anf Functions, Swami Vivekananda Yoga Prakashana, Bangalore.
2.	Makarand Madhukar Gore - Anatomy and Physiology of Yogic Practices, Motilal Banarsidass, New Delhi, 2007
3.	Anne Waugh, Allison Grant - Ross and Wilson Anatomy and Physiology in Health & Illness, Churchill Livingstone; 2010

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Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB203T	PROBABILITY STATISTICS AND QUEUEING THEORY (B.E CSE & B.TECH IT)	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Have a well – founded knowledge of standard distributions which can describe real life phenomena.
2	Acquire skills in handling situations involving more than one random variable and functions of random variables.
3	Understand test of hypothesis and how they relate to engineering applications.
4	Understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
5	Be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply basic probability techniques and models to analyze the performance of computer systems .
CO2	Illustrate and apply the concept of pairs of random variables from the knowledge of sampling distributions.
CO3	Understand the problems of Students T test for single mean and difference of means.
CO4	Use discrete time Markov chains to model computer systems.
CO5	Understand basic characteristic features of a queuing system and acquire skills in analyzing queuing model.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-	3	2	-
CO3	2	3	2	1	-	-	-	-	-	-	-	-	3	2	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-	3	3	-
CO (Avg)	2.4	2.4	[illegible]	[illegible]	-	-	-	-	-	-	-	-	2.8	2.2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	RANDOM VARIABLE AND STANDARD DISTRIBUTIONS	9*+3*
Random variable - Probability mass function - Probability density functions- Properties - Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, and Normal distributions and their properties .		
UNIT II	**TWO DIMENSIONAL RANDOM VARIABLES**	**9*+3***
Joint distributions - Marginal and conditional distributions – Covariance – Correlation and regression - Transformation of random variables - Central limit theorem.		
UNIT III	**TESTING OF HYPOTHESIS**	**9*+3***
Sampling distributions - Tests for single mean, Proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – chi-square test for goodness of fit – Independence of attributes.		
UNIT IV	**MARKOV PROCESSES AND MARKOV CHAINS**	**9*+3***
Classification-First order, Second order, strictly stationary order, wide-sense stationary - Markov process - Markov chains – Transition probabilities - Poisson process.		
UNIT V	**QUEUEING THEORY**	**9*+3***
Markovian models – Birth and Death queuing models - Steady state results: Single and multiple server queuing models with finite and infinite service ((M/M/1:∞/FCFS), (M/M/1:N/FCFS), (M/M/C:∞/FCFS), (M/M/C:N/FCFS)) - Pollaczek- Khintchine formula.		

Text Book (s)	
1	Oliver Ibe, "Fundamentals of Applied Probability and Random Processes" 2nd Edition, Elsevier, 2014
2	D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2002
3	R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 8th edition, 2007.
Reference (s)	
1	R.A Johnson, Miller & Freund's Probability and Statistics for Engineers, Seventh Edition, Pearson Education, Delhi, 2009.
2	Allen. A. O, Probability, Statistics and Queuing Theory: with computer Science Applications, Academic press, 2014.
3	Trivedi. K.S, Probability and Statistics with Reliability, Queuing and Computer Applications, John Wiley and sons, Second edition, 2012.
4	Taha.H.A, Operations Research: An Introduction, Eighth Edition, Prentice Hall of India Ltd, New Delhi, 2008.

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Regulation 2018		Semester III	Total Hours			60
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
S	18ECS202J	Analog and Digital Electronics	3	0	2	4

Prerequisite Course (s)

Basic Electrical and Electronics Engineering

Course Objective (s):

1	To understand the methods of biasing the Transistors & to know construction and characteristics of special diodes
2	To simplify Boolean expressions using basic postulates of Boolean algebra.
3	To synthesize the basic combinational circuits
4	To synthesize the basic Sequential circuits
5	To synthesize combinational and sequential logic using programmable logic devices.

Course Outcome (s) (COs):

CO1	Review various biasing techniques used in BJT and its characteristics.
CO2	Illustrate the Boolean functions and Boolean Expressions.
CO3	Design and Analyze the combinational circuits.
CO4	Design and Analyze the sequential circuits.
CO5	Analyze the characteristics and structure of different memory systems and programmable logic Devices

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	-	-	3	2	-	2	2	2
CO2	3	3	2	2	2	1	-	-	3	2	-	2	2	2
CO3	3	3	2	2	2	1	-	-	3	2	-	2	2	2
CO4	3	2	2	2	2	1	-	-	3	2	-	2	2	2
CO5	3	3	2	2	2	1	-	-	3	2	-	2	2	2
CO (Avg)	3	3	2	2	2	1	-	-	3	2	-	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	TRANSISTORS AND SPECIAL DIODES	9
Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics - The Metal-oxide-semiconductor FET (MOSFET) – The Low–frequency Common Source and Common Drain Amplifiers – Biasing the FET - Construction & Characteristics of UJT- SCR –TRIAC - DIAC.		
UNIT II	**BOOLEAN ALGEBRA AND LOGIC GATES**	**9**
Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Minimization of Boolean expressions– Sum of Products (SOP), Product of Sums (POS) and its Conversion– Minimization of Boolean Expression upto 4 variables using Karnaugh map, Tabulation Method-Don't care conditions. Introduction to Logic Gates - Implementation of Basic Gates using Universal gates.		
UNIT III	**COMBINATIONAL CIRCUITS**	**9**
Design procedure of Combinational circuits: Adders - Subtractors – Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- 2- bit Magnitude Comparator- Multiplexer / Demultiplexer - Encoder / Decoder – Parity Generator/Checker – Code converters: Binary to Gray – Gray to Binary - BCD to Excess 3 – Excess 3 to BCD.		
UNIT IV	**SEQUENTIAL CIRCUITS**	**9**
Flip flops SR, JK, T, D and Master slave – Characteristic and excitation tables and equations –Level and Edge Triggering –Realization of one flip flop using other flip flops – counters - Ring counters and Sequence detector - Design of Synchronous counters - Registers – shift registers- Universal shift register.		
UNIT V	**MEMORY AND PROGRAMMABLE LOGIC DEVICES**	**9**
Classification of memories – ROM Organization: PROM, EPROM, EEPROM – RAM Organization: Static RAM, Dynamic RAM - (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PROM, PLA, PAL.		
	LIST OF EXPERIMENTS	**15**

1. Design and construct Fixed Bias amplifier circuit using BJT
2. Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias).
3. Design and implementation of Adder / subtractor using basic gates and MSI devices.
4. Design and implementation of 2-bit and 8-bit magnitude comparator using basic gates and MSI devices.
5. Design and implementation of multiplexers and demultiplexers.
6. Design and testing of flip-flops using gates.
7. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops.

Text Book (s)

1	S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 4th Edition, Tata McGraw-Hill Education Pvt. Ltd, 2017.
2	Morris Mano, M, - Digital Design, Third Edition, Prentice Hall of India, New Delhi, 2003.

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Reference (s)	
1	Millman J and Halkias.C. Integrated Electronics, TMH, 2007.
2	David A. Bell, Electronic Devices & Circuits, 4th Edition, PHI, 2007
3	Roth, Charles H., - Fundamentals of Logic Design, Thomson Publication Company, New Delhi,2003.
4	Leach, Donald P. and Malvino, Albert Paul., - Digital Principles and Applications, Fifth Edition, Tata McGraw-Hill, New Delhi, 2003.
5	Givone, Donald D.,- Digital Principles and Design, Tata McGraw-Hill, New Delhi, 2003.

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Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC201J	DATA STRUCTURES AND ALGORITHMS	3	0	2	4

Prerequisite Course (s)

18CSS101J – Programming for Problem Solving

Course Objective (s):

The purpose of learning this course is to:

1	Impart the basic concepts of Data Structures and Algorithms.
2	Understand basic concepts about Stacks, Queues, Lists, Trees and Graph.
3	Understand concepts about Searching and Sorting techniques.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the Concepts of List and its applications.
CO2	Illustrate Stack and Queue data structures with its applications.
CO3	Summarize the basic operations in Binary Tree, Binary Search and AVL Tree.
CO4	Solve the Graph problem using various Graph Algorithms.
CO5	Apply various Sorting and Searching Algorithms for solving problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	3	-	-	-	3	1	-	-	3	3
CO2	3	3	2	2	3	-	-	-	3	-	-	-	3	3
CO3	3	3	2	2	3	-	-	-	3	-	-	-	3	3
CO4	3	3	2	2	3	-	-	-	3	-	-	-	3	3
CO5	3	3	2	2	3	-	-	-	3	1	-	-	3	3
CO (Avg)	3	3	2	2	3	-	-	-	3	1	-	-	3	3

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	LINEAR DATA STRUCTURES - LIST	9
Abstract Data Types (ADTs) - List ADT - Operations (Insertion, Deletion, Merge, Traversal) - Array based implementation - Linked list implementation : singly , circularly , doubly-linked lists - Applications of lists : Polynomial Manipulation.		
UNIT II	**LINEAR DATA STRUCTURES - STACK,QUEUE**	**9**
Stack ADT: Operations on Stack- Array Implementation - Linked List implementation - Applications of Stack: Expression Conversion and evaluation. Queue ADT : Operations on Queue - Array Implementation - Linked List Implementation - Circular Queue- Priority Queue - Applications of Queue.		
UNIT III	**TREE STRUCTURES**	**9**
Tree ADT : Basic Tree Terminologies - Binary Tree - Expression Tree - Tree Traversal - Binary Search Tree: Construction, Searching, Insertion, Deletion - AVL trees: Rotation, Insertion, Deletion - Applications of Trees.		
UNIT IV	**GRAPH ALGORITHMS**	**9**
Basic Terminologies - Representations of Graph - Topological sort - Graph Traversals : Breadth First Search - Depth First Search - Biconnectivity - Shortest Path algorithms : Unweighted Shortest Path - Dijkstra's algorithm - Minimum Spanning Trees : Prim's algorithm - Kruskal's Algorithm.		
UNIT V	**SORTING, SEARCHING AND HASH TECHNIQUES**	**9**
Sorting: Insertion sort - Selection sort - Shell sort - Bubble sort - Heap sort - Quick sort - Merge sort. Searching: Linear search - Binary Search .Hashing: Hash Functions - Separate Chaining - Open Addressing - Rehashing - Extendible Hashing.		
LIST OF EXPERIMENTS		**15**
1. Implementation of Stack and its operations 2. Implementation of Queue and its operations 3. Implementation of Singly Linked list and its operations 4. Implementation of Doubly Linked list and its operations 5. Implementation of polynomial addition using Linked list 6. Implementation of binary search tree and its operations 7. Implementation of insertion sort, selection sort 8. Implementation of Quick sort 9. Implementation of Linear and binary search 10. Implementation of Shortest path algorithms		

Text Book (s)

1	Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education, Third Edition, 2012.
2	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997.

Reference (s)

1	Reema Thareja, "Data Structures Using C", Oxford University Press, 2011.
2	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, The MIT Press, 2009.

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Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC202J	OBJECT ORIENTED PROGRAMMING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the fundamentals of object oriented programming in Java.
2	Learn the concepts of Array, String handling.
3	Study the basics of Generics and Collections.
4	Establish a firm foundation on core Java concepts like Exceptions and Concurrent programming.
5	Develop Graphical User Interface using Event Driven Programming.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Make use of Object Oriented programming concepts to solve real time problems.
CO2	Construct the programs with Inheritance, Packages and String handling mechanisms.
CO3	Utilize the different Collections and Input/Output streams.
CO4	Make use of Exception handling mechanisms and Multithreding to solve real time problems.
CO5	Develop simple applications using Event handling.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	3	1	-	-	3	3
CO2	3	2	-	-	3	-	-	-	3	1	-	-	3	3
CO3	3	2	-	-	3	-	-	-	3	1	-	-	3	3
CO4	3	2	-	-	3	-	-	-	3	1	-	-	3	3
CO5	3	3	-	-	3	-	-	-	3	1	-	-	3	3
CO (Avg)	3	2.2	-	-	3	-	-	-	3	1	-	-	3	3

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
OOP Concepts - Introduction to Java - JVM - Data types - Variables - Operators - Control statements - Classes and Methods - Instances and Initialization - Arrays - Constructors and Destructors - Garbage Collection.		
UNIT II	**INHERITANCE AND PACKAGES**	**8**
Inheritance - Access Specifiers - Interfaces - Default interface method - Polymorphism - Packages - this Pointer - String Handling.		
UNIT III	**GENERICS AND COLLECTIONS**	**10**
Enumerations - Type Wrappers - Autoboxing - Annotations - Generic classes - Generic methods - Generic interfaces - Collections - Lists - Sets - Maps - I/O streams.		
UNIT IV	**EXCEPTION HANDLING AND MULTITHREADING**	**9**
Exception handling - Exception hierarchy - Throwing and Catching exceptions - Throws - Finally - Built in Exceptions - User defined Exceptions - Chained exceptions - Multithreaded programming - Interrupting threads - Thread states - Thread priorities - Thread synchronization - Inter Thread Communication.		
UNIT V	**EVENT HANDLING**	**9**
The applet class - Basics of event handling - Delegation event model - Event classes - Event listener interfaces - Adapter classes - AWT.		
	LIST OF EXPERIMENTS	**15**

1. Simple Java program with classes and Instances
2. Programs using inheritance and dynamic polymorphism
3. Programs using Interface
4. Programs using String handling
5. Programs using Type Wrappers
6. Programs using Generics
7. Programs using Collection Classes
8. Programs using Exception Handling
9. Programs using Multithreading
10. Programs using AWT

Text Book (s)

1	Herbert Schildt, "Java the Complete Reference", Ninth edition, McGraw-Hill Osborne Media, 2014.
2	P.J.Deitel and H.M.Deitel, "JAVA™ HOW TO PROGRAM", seventh edition, Pearson International Edition, 2009.

Reference (s)

1	Timothy Budd, —An Introduction to Object-Oriented Programmingl, Third Edition, Pearson Education, 2008.
2	K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
3	Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

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Regulation 2018		Semester III	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC203T	OPERATING SYSTEMS	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Study the basic concepts and functions of operating systems.
2	Learn about processes, threads and scheduling algorithms.
3	Learn about deadlock and various memory management schemes.
4	Understand the files and disk management.
5	Learn the basics of Linux system and windows 7.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the concepts of OS, Process and Threads.
CO2	Apply various CPU Scheduling algorithms and Synchronization Techniques.
CO3	Utilize various schemes for deadlock handling and memory management.
CO4	Make use of various file and disk management strategy.
CO5	Explain the design principles of Linux and windows 7 Operating systems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	2	1	-	-	3	2
CO2	3	3	2	1	-	-	-	-	2	1	-	1	3	2
CO3	3	2	1	-	-	-	-	-	2	1	-	-	3	2
CO4	3	2	1	-	-	-	-	-	2	1	-	-	3	2
CO5	3	2	2	1	-	-	-	-	2	1	-	1	3	2
CO (Avg)	3	2.2	1.4	1	-	-	-	-	2.	1	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Introduction to operating systems - Types of computer systems – System structure: System calls and its types – System programs – Operating system structure – Operating system generation and System boot – Process management: Process concept– Process scheduling – Operations on processes –Inter Process Communication – Multithreaded Programming: Overview – Models.		
UNIT II	**PROCESS SCHEDULING**	**9**
Scheduling criteria – Scheduling algorithms – Thread scheduling– Real time scheduling – Process Synchronization: The critical section problem – Semaphores – Classic problems of synchronization – Monitors.		
UNIT III	**DEADLOCK AND MEMORY MANAGEMENT**	**9**
Deadlock: Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock – Memory management: Swapping – Contiguous memory allocation – Paging – Segmentation – Structure of the page table – Virtual Memory: Demand paging – Page replacement – Allocation of frames.		
UNIT IV	**STORAGE MANAGEMENT**	**9**
File concept – Access methods – Directory and Disk structure – File system mounting – File sharing – Protection – File system implementation – Directory implementation – Allocation methods – Free-space management – Mass Storage Structure: Disk scheduling – Swap-space management.		
UNIT V	**CASE STUDY**	**9**
Linux System: Design principles – Kernel modules – Process management – Scheduling – Memory management – File systems – Windows 7: Design principles – System components – Terminal services and Fast user switching - File systems.		
Text Book (s)		
1	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2015.	
Reference (s)		
1	Andrew S. Tanenbaum, Herbert Bos "Modern Operating Systems", Fourth Edition, Pearson Education 2017.	
2	William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.	

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Regulation 2018		Semester III	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC204T	COMPUTER ARCHITECTURE AND ORGANIZATION	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basic structure and operations of digital computer.
2	Study the design of arithmetic and logic unit and implementation of fixed-point and floating-point arithmetic operations.
3	Study the concepts of control unit and pipelining.
4	Study the organization of memory unit.
5	Study the interfacing of I/O devices.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the organization and working principle of computer hardware components.
CO2	Solve the problems using various arithmetic algorithms.
CO3	Analyze the execution sequence of instruction.
CO4	Explain the hierarchy of memory systems.
CO5	Summarize the concepts of I/O organization.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	2	2	-	-	3	2
CO2	3	3	-	-	-	-	-	-	3	-	-	-	3	2
CO3	3	3	-	-	-	-	-	-	3	-	-	-	3	2
CO4	3	2	-	-	-	-	-	-	-	2	-	-	3	2
CO5	2	2	-	-	-	-	-	-	-	-	-	-	3	2
CO (Avg)	2.8	2.4	-	-	-	-	-	-	2.6	2	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	BASIC STRUCTURE OF COMPUTERS	9
Functional Units – Basic Operational Concepts – Bus Structures – Software Performance – Memory Locations and Addresses – Memory Operations – Instruction and Instruction Sequencing – Addressing Modes – Assembly Language.		
UNIT II	**ARITHMETIC UNIT**	**9**
Addition and Subtraction of Signed Numbers – Multiplication of Unsigned Numbers – Signed Operand Multiplication – Fast Multiplication – Integer Division – Floating-Point Numbers and Operations.		
UNIT III	**BASIC PROCESSING UNIT AND PIPELINING**	**9**
Basic Processing Unit : Fundamental Concepts – Execution of a Complete Instruction – Multiple Bus Organization – Hardwired Control – Micro Programmed Control – Pipelining : Basic Concepts – Data Hazards – Instruction Hazards – Influence on Instruction Sets – Data Path and Control Consideration – Superscalar Operation.		
UNIT IV	**MEMORY SYSTEM**	**9**
Memory Concepts – Semiconductor RAMs – ROMs – Speed, Size and Cost – Cache Memories – Performance Considerations – Virtual Memories – Memory Management Requirements.		
UNIT V	**I/O ORGANIZATION**	**9**
Accessing I/O Devices – Interrupts – Direct Memory Access – Buses – Standard I/O Interfaces: PCI - SCSI – USB.		

Text Book (s)

1	Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Sixth Edition,McGraw Hill Education (India) Edition, 2012.

Reference (s)

1	David A. Patterson and John L. Hennessey, "Computer organization and design, The Hardware/Software interface", Morgan Kauffman / Elsevier, Fifth edition, 2014.
2	William Stallings, "Computer Organization and Architecture - Designing for Performance", Ninth Edition, Prentice Hall, 2012.
3	John P.Hayes, "Computer Architecture and Organization", Third Edition, McGraw Hill, 2012.

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Regulation 2018		Semester III	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM201L	COMPETENCIES IN SOCIAL SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Sharpen problem solving skill and to improve thinking capability of the students
2	Hone soft skill and analytical ability of students
3	Engage learners in using language purposefully and cooperatively
4	Expertise the writing and presentation skill to fulfill the corporate expectations

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in an effective manner
CO2	Design and deliver information in a proper manner
CO3	Improve their presentation skills individually as well as a team member

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	-	2	-	-			
CO3	-	-	-	-	-	-	-	-	2	-	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	2.00	2.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	Module - 1	6
Aptitude: Coding & Decoding - Direction Sense Test. **Communication:** Self-Introduction and SWOT analysis - Letter writing - types.		
UNIT II	Module - 2	6
Aptitude: Venn Diagrams - Data Interpretation. **Communication:** Phrasal verbs - Voice of Valluvar.		
UNIT III	Module - 3	6
Aptitude: Averages. **Communication:** Idioms and Phrases - Skits.		
UNIT IV	Module - 4	6
Aptitude: Time and Distance - Problems on Trains. **Communication:** Prefix/Suffix - Root words - Adjectives - JAM (Extempore Speech).		
UNIT V	Module - 5	6
Aptitude: Clocks & Calendars. **Communication:** Homophones - Frame Tales.		

Text Book (s)	
1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

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Regulation 2018		Semester III / Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18CYM201T	Environmental Science	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- To demonstrate in-depth knowledge within environmental engineering and an awareness of social, economic, political, and environmental impacts of engineering practices.
- To have competence for working with multi-disciplinary teams to arrive at solutions to environmental engineering problems.
- To get solutions which will minimize the negative impact of human activities on the environment and to protect human health

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Improve fundamental knowledge of the inter-relationships between the built environment and natural systems
CO2	Characterize and mitigate man-made hazards like nuclear hazards. Understand the principles involved in the generation of different forms of energy
CO3	Improve the reliability, performance, disaster-management of natural calamities and solid waste and water supplies and treatment processes.
CO4	Understand the source, effects and control measure of various environmental pollution
CO5	Apply information technology in the control of human population and women and child welfare

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	3	-	-	-	-	-	-	-
CO2	-	2	-	-	-	3	3	-	-	-	-	-	-	-
CO3	-	2	-	2	-	3	3	-	-	-	-	-	-	-
CO4	-	2	-	-	-	3	3	2	-	-	-	-	-	-
CO5	-	2	-	2	-	3	3	-	-	-	-	-	-	-
CO (Avg)	-	2.00	-	2.00	-	3.00	3.00	2.00	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Approved By Board of Science & Humanities 29 MAR 2019

UNIT I	ENVIRONMENT& BIODIVERSITY	3
Definition-types of environment, components of environment, scope-importance of environmental studies- Bio diversity-definition-value of biodiversity-Threats to biodiversity - India a mega diversity nation-endangered and endemic species of India-conservation of biodiversity.		
UNIT II	ENERGY SOURCES	3
Energy resources- Growing energy needs- Renewable and Nonrenewable energy sources- Use of alternate energy sources - Nuclear Energy- Alternative energy fuels-power alcohol-Bio diesel (preparation, properties &uses)		
UNIT III	SOCIAL ISSUES AND ENVIRONMENT	3
Environment ethics – Climate change – Global warming – Acid rain – Ozone layer depletion –Nuclear accidents-holocaust. Solid waste management - Rain water Harvesting-watershed management-		
UNIT IV	ENVIRONMENTAL POLLUTION & ACTs	3
Source, types, effects & control- Air pollution -Water pollution – Soil pollution – Marine pollution and Plastic Pollution -The Environment (Protection) Act - Air (Prevention and control of pollution) Act - Water (Prevention and control of pollution) Act- Role of individual in prevention of pollution.		
UNIT V	HUMAN POPULATION AND ENVIRONMENT	3
Sustainable development – Urban Population growth and distribution – Population explosion – Family Welfare Program –Women and child welfare- Role of information technology in environment and human health- case studies		

Text / Reference (s) books:

1	Dr.J.P.Sharma, " Environmental studies" , Laxmi Publications(p) Ltd, New Delhi.
2	Miller "Environmental Science" 11th Edition, Cengage Learning India Private Limited, New Delhi, (2006).
3	Master. G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt Ltd., (2004)
4	Dr.A.Ravikrishnan " Environmental Science and Engineering " Sri Krishna publications, Chennai(2015)
5	P.Anandan, R.Kumaravelan "Environmental Science and Engineering" Scitech Publication (India) Pvt. Ltd, Chennai, Reprint 2009.

Approved By
Board of Studies & Committees
29 MAR 2019

Regulation 2018		Semester III/ Semester IV	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM103T	INDIAN TRADITION AND HERITAGE	1	0	0	-

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Make students understand the role and impact of culture in human life.
CLR-2	Draw attention towards languages and literatures of ancient period.
CLR-3	Cultivate secularism in students
CLR-4	Equip students with the knowledge of Indian art and architectural evolution over years.
CLR-5	Make students identify Indian culture in abroad.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Understand the meaning of culture, trace the influence and significance of geographical features on Indian culture.
CO2	Develop an awareness of the variety of languages and literatures in India.
CO3	Recognise the characteristics of various religious movements in ancient India.
CO4	Identify the characteristics and various styles of Indian architecture and sculpture at different times.
CO5	Examine various modes through which Indian culture spread abroad.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	2	2	1	2	2	1	2	-	-	-
CO3	-	-	-	-	-	1	1	1	1	1	1	1	-	-	-
CO4	2	2	2	2	2	2	2	2	2	2	1	2	-	-	-
CO5	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO (Avg)	2	2	2	2	2	1.8	1.8	1.6	1.8	1.8	1	1.8	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	HISTORY OF INDIAN CULTURE	2
Characteristics of Indian Culture - Significance of Geography on Indian Culture -Society in India through ages- Ancient Period - Varna and Jati, family and marriage in India - Position of women in ancient India- Contemporary period; Caste system and communalism.		
UNIT II	LITERATURE AND EDUCATION	4
Evolution of script and languages in India : Harappan Script and Brahmi Script, Short History of the Sanskrit Literature: The Vedas, The Brahmanas and Upanishads and Sutras, Epics: Ramayana and Mahabharata&Puranas - History of Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, Sangam Literature and Odia Literature.		
UNIT III	RELIGION AND PHILOSOPHY	4
Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainisim, Indian Philosophy - Vedanta and Mimansa school of Philosophy.		
UNIT IV	ART AND ARCHITECTURE	2
Indian Art & Architecture: Gandhara School and Mathura School of Art; Hindu Temple Architecture, Budhhist Architecture, Medieval Architecture and Colonial Architecture, Indian Painting Tradition, Performing Arts: Divisions of Indian classical music: Hindustani and Carnatic, Dances of India, Rise of modern theatre and Indian cinema.		
UNIT V	SPREAD OF INDIAN CULTURE ABROAD	3
Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia, India, Central Asia and Western World through ages.		
Text Book (s)		
	Nil	
Reference (s)		
Chakravarti, Ranabir: Merchants, Merchandise & Merchantmen, in: Prakash, Om (ed.): *The Trading World of the Indian Ocean, 1500-1800* (*History of Science, Philosophy and Culturein Indian Civilization,* ed. by D.P. Chattopadhyaya, vol. III, 7), Pearson, Delhi, 2012.		

Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB206T	DISCRETE MATHEMATICS (B.E CSE & B.TECH IT)	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Obtain general knowledge about the area of discrete mathematics
2	Understand a variety of methods and to construct mathematical proofs
3	Model situations in a mathematical way and derive useful results

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Demonstrate their knowledge in propositional calculus
CO2	Demonstrate their knowledge in predicate calculus
CO3	Obtain the perception in the area of sets and the knowledge about functions.
CO4	Obtain perception in the area of combinatorics
CO5	Obtain perception in the area of graph theory

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	-	-	3	2	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-	3	2	-
CO3	2	1	1	-	-	-	-	-	-	-	-	-	3	2	-
CO4	2	1	1	-	-	-	-	-	-	-	-	-	3	2	
CO5	3	2	2	1	-	-	-	-	-	-	-	-	3	3	-
CO (Avg)	2.6	1.6	1.2	1	-	-	-	-	-	-	-	-	3	2.2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PROPOSITIONAL CALCULUS	9 + 3
Propositions- Logical connectives-Compound propositions-Conditional and Biconditional propositions- Truth tables - Tautologies and Contradictions - Logical and equivalences and implications - DeMorgan's Laws-Normal forms-Principal conjunctive and disjunctive normal forms - Rules of inference-Arguments-Validity of arguments.		
UNIT II	PREDICATE CALCULUS	9 + 3
Predicates-Statement Function -Variables-free and bound variables- Quantifiers- Universe of discourse- Logical equivalences and implications for quantified statements- Theory of inference- The rules of universal specification and generalization-Validity of arguments.		
UNIT III	SET THEORY AND FUNCTIONS	9 + 3
Set Operations-properties-Power set-Relations-Graph and matrix of a relation- Partial Ordering- Equivalence relations-Partitions- Functions -Types of Functions- composition of relation and functions- inverse functions.		
UNIT IV	COMBINATORICS	9 + 3
Basics of Counting - Counting arguments- Pigeonhole Principle- Permutations and Combinations- Recursion and Recurrence relations-Generating Functions- Mathematical Induction- Inclusion -Exclusion		
UNIT V	GRAPH THEORY	9 + 3
Introduction to Graphs-Graph Operations- Graph and Matrices-Graph Isomorphism- Connected Graphs- Euler Graphs- Hamilton Paths and Circuits- Planar Graph-Graph Colouring-Trees- Shortest Path Problem-Directed and Undirected Graphs- Flows in Networks.		

Text Book (s)

1	Trembly J.P and Manohar R. —Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.
2	Ralph. P. Grimaldi, —Discrete and Combinatorial Mathematics: An Applied Introduction, Fourth Edition, Pearson Education Asia, Delhi, 2002.

Reference (s)

1	Kenneth H Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, Seventh Edition, McGraw Hill Education India Private Limited, New Delhi, 2013.
2	A.Doerr and K.Levasseur, Applied Discrete Structures, Galgotia Publication, New Delhi, 2004.
3	Gilbert Strang, "Introduction to Linear Algebra", 4th edition Wellesley- Cambridge Press, 2009.
4	Johnsonbaugh, Richard, "Discrete Mathematics", Sixth Edition, Maxwell, International Edition, 2006.

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Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week L	T	P	C
S	18ECS203J	Microprocessor and Microcontroller	3	0	2	4

Prerequisite Course (s)

Analog and Digital Electronics

Course Objective (s):

1	To understand Basic architectures and operational features of the processors and Controllers
2	To Design and understand the multiprocessor configurations
3	To Understand the interfacing concepts of the peripheral devices with that of the Processors
4	To study the Architecture of 8051 microcontroller
5	To design a microcontroller based system

Course Outcome (s) (COs):

CO1	Observe the architecture, instruction set and addressing modes of 8086.
CO2	Record the configurations of multiprocessor.
CO3	Describe the various interfaces such as 8255, 8251, 8254 etc.,
CO4	Discuss the architecture of 8051 and apply the fundamentals of assembly level programming of 8051 controller.
CO5	Know various real time applications of Microcontrollers.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	3	2	-	-	3	3
CO2	3	2	3	2	2	-	-	-	3	2	-	-	2	3
CO3	3	3	2	3	2	-	-	-	3	2	-	-	3	3
CO4	3	2	3	2	2	-	-	-	3	2	-	-	3	3
CO5	3	3	2	3	2	-	-	-	3	2	-	-	3	3
CO (Avg)	3	3	3	3	2	-	-	-	3	2	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	8086 MICROPROCESSOR	9

8086 microprocessor –Register organization of 8086- Architecture – Signal description of 8086 – Minimum and maximum mode of 8086 system - Addressing Modes - Instruction Set - Assembly Language Programming - Interrupts and Interrupt Service Routines.

UNIT II	MULTIPROCESSOR CONFIGURATION	9

Interconnection Topologies - Coprocessor Configuration – Closely Coupled Configuration – Loosely Coupled Configuration – 8087 Numeric Data Processor – Architecture – Bus Arbitration - 8089 I/O Processor – Architecture.

UNIT III	INTERFACING WITH MICROPROCESSORS	9

Memory interfacing with Microprocessors – Parallel Communication Interface (8255) – Serial Communication Interface (8251) – Timer (8254) - Keyboard/display controller (8279) – DMA controller (8237).

UNIT IV	MICROCONTROLLER	9

Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V	MICROCONTROLLER PROGRAMMING	9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor, Traffic light Controller.

LIST OF EXPERIMENTS	15

1. Arithmetic and Logical Operation using 8086 Microprocessor.
2. Programming with 8086- Code Conversion and Matrix Multiplication.
3. Interfacing with 8086-Parallel Communication Interface
4. Interfacing with 8086-Serial Communication Interface.
5. Interfacing with 8086 - Keyboard and Display Controller.
6. Arithmetic and Logical Operation using 8051 Microcontroller.
7. Stepper motor Interfacing with 8051 Microcontroller

Text Book (s)

1	Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family -Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007.
2	A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", 3rd edition, Tata Mc Graw Hill, 2015.

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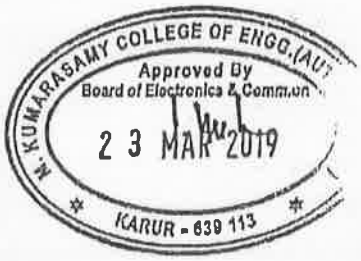
Reference (s)	
1	Muhammad Ali Mazidi, Jamice Gillispit Mazidi, "The 8051 micro controller and Embedded System", 2nd Edition,Pearson Education 2006
2	Kenneth Ayala, "The Microcontroller Architecture - Programming and Applications", 3rd Edition, Cengage Learning,2004.
3	N. Senthil Kumar, M. Saravanan, S. Jeevananthan "Microprocessors and Microcontrollers", 2nd Edition, Oxford Higher Education, 2018.
4	Douglas V.Hall and SSSP Rao, " Microprocessors and Interfacing", third edition,Tata Mc Graw Hill ,2012.



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Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC205J	DATABASE MANAGEMENT SYSTEMS	3	0	2	4

Prerequisite Course (s)

18CSC201J - Data Structures and Algorithms

Course Objective (s):

1	Understand the principles of database design.
2	Sketch the features of relational database using Structured Query Language.
3	Learn the techniques for controlling concurrent transactions.
4	Study about query processing and its optimization techniques.

Course Outcome (s) (COs):

CO1	Explain database and various data models .
CO2	Illustrate the features of SQL and PL/SQL commands .
CO3	Apply the concepts of normalization to eradicate anomalies from the database .
CO4	Outline the significance of various concurrency control techniques .
CO5	Summarize the techniques to optimize a query for reducing the cost of execution .

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	3	1	-	-	3	2
CO2	3	3	3	-	3	-	-	-	3	1	-	-	3	3
CO3	3	3	3	-	-	-	-	-	3	1	-	-	3	2
CO4	3	3	2	-	-	-	-	-	3	1	-	-	3	2
CO5	3	2	2	-	3	-	-	-	3	1	-	-	3	2
CO (Avg)	3	2.8	2.6	-	3	-	-	-	3	1	-	-	3	2.2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FUNDAMENTALS OF DATABASE DESIGN	9

Purpose of Database Systems – View of Data - Database System Architecture – Database Users and Administrators – Data Models – Entity Relationship(ER) Model – Constraints – Entity Sets – Attributes – Keys – E-R Diagrams – Design Issues - Extended E-R Features – Introduction of Relational Model – E-R Reduction to Relational Schemas.

UNIT II	RELATIONAL DATABASE	9

Structure of Relational Databases – Schema Diagrams – Relational Query Languages - Relational Algebra – Queries in SQL – Set Operations – Aggregate Operations – Joins – Views – Integrity Constraints – Authorization – SQL Application Programming using C and Java.

UNIT III	LOGICAL DATABASE DESIGN	9

Need for good database design – Functional Dependencies and Keys – Closure of Functional Dependencies Set – Closure of attributes - Dependency Preservation - Decomposition using Functional dependencies – Atomic domains and First Normal Form – Second Normal Form – Third Normal Form – Boyce Codd Normal Form.

UNIT IV	TRANSACTION AND CONCURRENCY CONTROL	9

Transaction Model – ACID properties – Transaction States – Serializability: Conflict serializability,View Serializability – Concurrency Control: Lock Based Protocols – Deadlocks: Time Stamp Based Protocols , Validation Based Protocols – Recovery System.

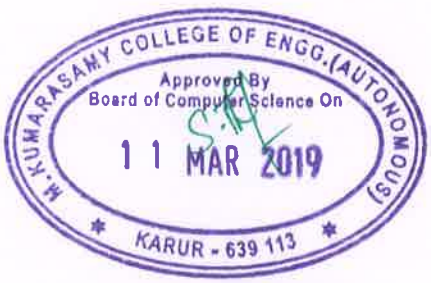
UNIT V	QUERY PROCESSING AND OPTIMIZATION	9

Indexing and Hashing – Query Processing – Measures of Query Cost – Join Operation – Evaluation of Expressions – Transformation of Relational Expressions – Choice of Evaluation Plans – Materialized Views.

LIST OF EXPERIMENTS	15

1. Design a database for enterprise applications with the various Data Models
2. DDL commands
   a. Creation of tables
   b. Usage of alter, drop commands
3. DML commands
   a. Data Insertion using different ways
   b. Integrity constraints
   c. Usage of truncate command
4. SQL Queries
   a .Simple SQL Queries
   b. Nested Queries
   c. Aggregation Functions
   d. Grouping and Ordering commands
5. Join Queries in SQL
6. Normalization of Relation
7. DCL and TCL commands
   a. Setting privileges and revoke privileges

	b. Save point, rollback and rollback to commands 8. Introduction about PL/SQL and conditional Statements 9. Cursor in PL/SQL 10. Trigger in PL/SQL 11. Procedure and Function in PL/SQL 12. Develop an Enterprise application with suitable User Interface and database
Text Book (s)	
1	Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", McGraw Hill, Sixth Edition, 2013.
2	C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.
Reference (s)	
1	Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Fourth Edition, 2015.
2	R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Pearson Education/Addison Wesley, Sixth Edition, 2014.
3	Steven Feuerstein, Bill Pribyl — Oracle PL/SQL Programming, Sixth Edition, O'Reilly Media, February 2014.
4	Oracle® Database, PL/SQL Language Reference, 11g Release 2 (11.2), December 2014.
5	Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Pearson Education, Fifth Edition, 2009.
6	James Groff, Paul Weinberg, Andy Oppel — SQL: The Complete Reference, 3rd Edition, McGraw-Hill, 2009.



Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC206J	COMPUTER NETWORKS	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

1	Understand the various layering protocol and physical mode of communication.
2	Understand the different types of networks and analyze the performance of a networks.
3	Learn the functions of network layer and the various routing protocols.
4	Familiarize the functions and protocols of the Transport layer.
5	Understand the working of various application layer protocols.

Course Outcome (s) (COs):

CO1	Understand the basic layers and its functions in computer networks.
CO2	Evaluate the performance of a network.
CO3	Analyze and design routing algorithms.
CO4	Design protocols for various functions in the network.
CO5	Understand the working of various application layer protocols.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	-	2	2	1	-	1	3	3
CO2	3	2	2	2	2	-	-	2	2	1	-	1	3	2
CO3	3	2	2	2	2	-	-	2	2	1	-	1	3	2
CO4	3	2	2	2	2	-	-	2	2	1	-	1	2	2
CO5	3	2	2	2	2	-	-	2	2	1	-	1	2	2
CO (Avg)	3	2	2	-	2	-	-	2	2	1	-	1	2.60	2.20

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO NETWORKS AND PHYSICAL LAYER	9
Introduction: Components – Representation of data – Physical topology – Categories of network – Layering and protocols TCP/IP Protocol Architecture – Transmission media – Circuit Switching - Packet Switching.		
UNIT II	**DATALINK LAYER & MEDIA ACCESS CONTROL**	**9**
Link layer services – Framing – Error detection and control – Flow control – Media Access Control(MAC) – Wired LANs: Ethernet – Wireless LANs - CSMA/CD – Token ring – FDDI– CSMA/CA.		
UNIT III	**ROUTING PROTOCOLS**	**9**
Introduction to routing – IPv4 – IPv6 – Subnetting – Unicast Routing Protocol: Distance Vector Routing, Link State Routing , Path Vector Routing – ARP – DHCP – ICMP.		
UNIT IV	**TRANSPORT LAYER TCP & UDP**	**9**
Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol(UDP) – Transmission Control Protocol(TCP) – Congestion control in transport layer.		
UNIT V	**APPLICATION LAYER**	**9**
Responsibilities of application layer – HTTP – WWW – FTP – Email Protocols: SMTP, POP3, IMAP, MIME – DNS – SNMP.		
	LIST OF EXPERIMENTS	**15**

1. Study about Basic Network and its types
2. Build a Small Network using Switch
3. Learn to use Basic Network commands like netstat, ifconfig, trace route, ping, etc.
4. Applications using TCP sockets
5. Applications using UDP sockets
6. Study of TCP/UDP performance using Simulation tool
7. Installation of Network Simulation Tool
8. Simulation of DNS using UDP sockets
9. Performance evaluation of Routing protocols using Simulation tool
10. Simulation of Distance Vector / Link State Routing algorithm

Text Book (s)

1	Behrouz A Forouzan 'Data Communication and Networking', Fourth Edition, Mcgraw Hill, 2016
2.	Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2015

Reference (s)

1	Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
2	William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3	James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

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Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC207T	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3

Prerequisite Course (s)

18CSC201J - Data Structures and Algorithms

Course Objective (s):

The purpose of learning this course is to:

1	Develop an understanding about basic algorithms and different problem solving strategies.
2	Improve creativeness and the confidence to solve non-conventional problems and expertise for analyzing existing solutions.

Course Outcome (s) (COs):

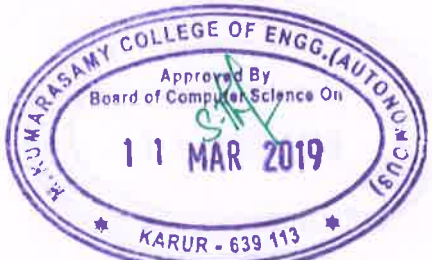
At the end of this course, learners will be able to:

CO1	Solve recurrence equations using Iteration Method, Recurrence Tree Method and Master's Theorem.
CO2	Design algorithms using Divide and Conquer Strategy and Greedy Strategy.
CO3	Design efficient algorithms using Dynamic Programming, Back Tracking and Branch Bound Techniques for solving problems.
CO4	Solve Optimization problems using Flow networks and String matching.
CO5	Classify computational problems into P, NP, NP-Hard and NP-Complete.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	2	1	-	-	3	2
CO2	3	2	-	-	-	-	-	-	2	1	-	-	3	2
CO3	3	2	-	-	-	-	-	-	2	1	-	-	3	2
CO4	3	2	-	-	-	-	-	-	2	1	-	-	3	2
CO5	3	2	-	-	-	-	-	-	2	1	-	-	3	2
CO (Avg)	3	2	-	-	-	-	-	-	2	1	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**



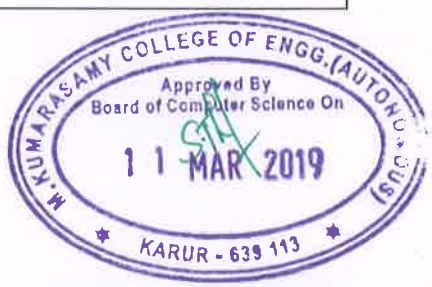
UNIT I	ANALYSING ALGORITHMS	9
The Role of Algorithms in Computing - Growth of Functions – Recurrences - The Substitution Method - The Recurrence Tree Method - The Master Method - Probabilistic Analysis and Randomized Algorithms – Amortized Analysis – Aggregate Analysis – Accounting Method - Asymptotic Notation.		
UNIT II	**DIVIDE AND CONQUER & GREEDY DESIGN STRATEGIES**	**9**
Analysis of Quick Sort, Merge Sort – Quick Sort Randomized Version – Sorting in Linear Time - Lower Bounds for Sorting - Selection in Expected Linear Time - Selection in Worst case Linear Time – Greedy Algorithms - Elements of Greedy Strategy - Huffman Code, Dijkstra's Shortest Path Algorithm.		
UNIT III	**DYNAMIC PROGRAMMING AND BACKTRACKING**	**9**
Dynamic Programming – Matrix Chain Multiplication - Elements of Dynamic programming – Longest Common Sequences – Warshall's and Floyds Algorithm – Transitive Closure - All Pairs Shortest Path Algorithm – Analysis – Backtracking – Graph Coloring Problem - Branch and Bound Strategy - Knapsack Problem.		
UNIT IV	**FLOW NETWORKS AND STRING MATCHING**	**9**
Flow Networks – Ford Fulkerson Method - String Matching - Naive String Matching Algorithm – Knuth Morris Pratt Algorithm.		
UNIT V	**NP PROBLEMS**	**9**
NP-Completeness – Polynomial Time Verification – Theory of Reducibility - Circuit Satisfiability – NP - Completeness Proofs – NP Complete Problems: Vertex Cover, Hamiltonian Cycle and Travelling Salesman Problems – Approximation Algorithms – Approximation Algorithms to Vertex-Cover and Travelling Salesman Problems.		

Text Book (s)

1	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Cliford Stein, —Introduction to Algorithms, Third Edition, Prentice Hall, 2010.
2	Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran, —Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2008.

Reference (s)

1	Harsh Bhasin, —Algorithms Design and Analysis, Oxford university press, 2016.
2	S. Sridhar, —Design and Analysis of Algorithms, Oxford university press, 2014.
3	Anany Levitin, —Introduction to the Design and Analysis of Algorithms, Third Edition, Pearson Education, 2012
4	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, —Data Structures and Algorithms, Pearson Education, Reprint 2006.



Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC208T	HUMAN COMPUTER INTERACTION	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Provide in-depth understanding of the methods and techniques that can be utilized in the design, implementation and testing of user interfaces.
2	Develop critical capabilities that enable evaluation and selection of appropriate methods and techniques for interface design.
3	Engender practical abilities in visual and technical aspects of the design process.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain basics of human computer interacting criterion.
CO2	Outline standard design heuristics for making human computer interactive systems.
CO3	Evaluating strategies and assisting methodologies of HCI systems.
CO4	Explain user models and task models to study various norms available in human computer interactions.
CO5	Explain impact and necessity of dialogs and groupware prospective in HCI systems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	-	-	1	3	1
CO2	3	1	-	-	-	-	-	-	1	-	-	1	3	1
CO3	3	2	2	-	-	-	-	-	-	1	-	1	3	1
CO4	3	2	-	-	-	-	-	-	1	-	-	1	3	1
CO5	3	2	2	1	1	-	-	-	-	1	-	1	3	1
CO (Avg)	3	1.6	2	1	1	-	-	-	1	1	-	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	FOUNDATIONS OF HUMAN–COMPUTER INTERACTION	9
Introduction – Input channels and Output channels: Vision, Hearing, Touch, Movement – Human memory: Sensory memory, STM and LTM – Thinking-Reasoning and problem solving, Emotions, Individual difference, psychology – Text entry devices, display devices: 3D interaction, paper, memory, processing and networks, Ergonomics, Interaction styles.		
UNIT II	**DESIGN PROCESS**	**9**
The User Interface Design Process –Design Standards or Style Guides – System Training and Documentation needs - Menus – Structures of Menus – Functions of Menus – Contents of Menu – Formatting – Phrasing the Menu – Selecting Menu Choices – Navigating Menus – Graphical Menus.		
UNIT III	**WINDOWS**	**9**
Characteristics – Components – Presentation Styles – Types of windows – Window Management – Organizing Window Functions – Window Operations – Web Systems – Device Based Controls – Characteristics of Device Based Controls – Selecting the Proper Device Based Controls – Screen Based Controls – Operable Controls – Text Entry / Read-Only Controls – Selection Controls – Combination Entry – Custom Controls – Presentation Controls – Other Operable Controls.		
UNIT IV	**MULTIMEDIA**	**9**
Text for Web Pages – Providing Effective Feedback and Guidance and Assistance – Providing the Proper Feedback – Guidance and Assistance – International Considerations – Accessibility – Icons and Images – Multimedia – Coloring – Choosing the Proper Colors.		
UNIT V	**WINDOWS LAYOUT TEST**	**9**
Prototypes – Kinds of tests – Retest – Information Search – Visualization – Hypermedia – WWW–Software Tools.		

TEXT BOOK(S):

1.	Wilbert. O. Galitz, —The Essential Guide to User Interface Design, Wiley - India, Second Edition, 2012.
2.	Alan Dix, Janet Finlay, Gregory D. Abowd and Russel Beale, "Human Computer Interaction", 3rd Edition, 2004, Pearson Education, ISBN: 978-0130461094
3.	Deborah Mayhew, —The Usability Engineering Lifecycle, Morgan Kaufmann, 1999.

REFERENCE(S):

1.	Ben Sheiderman, —Design the User Interface, Pearson Education, 1998.
2.	Alan Cooper, —The Essential of User Interface Design, Wiley – Dream Tech Ltd 2002.
3.	Sharp, Rogers, Preece, _Interaction Design', Wiley India Edition, 2007.

Regulation 2018		Semester IV	Total Hours			30
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18MBM202L	CRITICAL AND CREATIVE THINKING SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Focus on listening, speaking, & writing skills through audio & video sessions
2	Hone soft skill and analytical ability of students
3	Overcome the fear in group communication and to provide the effective communication
4	Expertise intelligible pronunciation, stress and intonation patterns

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in an effective manner
CO2	Demonstrate an ability to design and deliver messages
CO3	Improve their communication with practical experience

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	-	2	-	-			
CO3	-	-	-	-	-	-	-	-	-	2	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	-	2.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	Module - 1	6
Aptitude: Time and Work - Pipes and Cisterns. **Communication:** Sentence Pattern - Debate.		
UNIT II	Module - 2	6
Aptitude: Boats and Streams. **Communication:** Tenses and voices - Tech Talk.		
UNIT III	Module - 3	6
Aptitude: Problems on Ages - Probability **Communication:** Analogies - Biography.		
UNIT IV	Module - 4	6
Aptitude: Data sufficiency - Logical Puzzles. **Communication:** Punctuation - Connection.		
UNIT V	Module - 5	6
Aptitude: Mensuration. **Communication:** Preposition - News of the Week.		

Text Book (s)	
1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

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25 MAR 2019
KARUR-639 113.

Regulation 2018		Semester III / Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18CYM201T	Environmental Science	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- To demonstrate in-depth knowledge within environmental engineering and an awareness of social, economic, political, and environmental impacts of engineering practices.
- To have competence for working with multi-disciplinary teams to arrive at solutions to environmental engineering problems.
- To get solutions which will minimize the negative impact of human activities on the environment and to protect human health

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Improve fundamental knowledge of the inter-relationships between the built environment and natural systems
CO2	Characterize and mitigate man-made hazards like nuclear hazards. Understand the principles involved in the generation of different forms of energy
CO3	Improve the reliability, performance, disaster-management of natural calamities and solid waste and water supplies and treatment processes.
CO4	Understand the source, effects and control measure of various environmental pollution
CO5	Apply information technology in the control of human population and women and child welfare

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	3	-	-	-	-	-	-	-
CO2	-	2	-	-	-	3	3	-	-	-	-	-	-	-
CO3	-	2	-	2	-	3	3	-	-	-	-	-	-	-
CO4	-	2	-	-	-	3	3	2	-	-	-	-	-	-
CO5	-	2	-	2	-	3	3	-	-	-	-	-	-	-
CO (Avg)	-	2.00	-	2.00	-	3.00	3.00	2.00	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGG. (AUTONOMOUS)
Approved by
Board of Studies & Academic Council
29 MAR 2019
KARUR - 639 113

UNIT I	ENVIRONMENT& BIODIVERSITY	3
Definition-types of environment, components of environment, scope-importance of environmental studies- Bio diversity-definition-value of biodiversity-Threats to biodiversity - India a mega diversity nation-endangered and endemic species of India-conservation of biodiversity.		
UNIT II	ENERGY SOURCES	3
Energy resources- Growing energy needs- Renewable and Nonrenewable energy sources- Use of alternate energy sources - Nuclear Energy- Alternative energy fuels-power alcohol-Bio diesel (preparation, properties &uses)		
UNIT III	SOCIAL ISSUES AND ENVIRONMENT	3
Environment ethics – Climate change – Global warming – Acid rain – Ozone layer depletion –Nuclear accidents-holocaust. Solid waste management - Rain water Harvesting-watershed management-		
UNIT IV	ENVIRONMENTAL POLLUTION & ACTs	3
Source, types, effects & control- Air pollution -Water pollution – Soil pollution – Marine pollution and Plastic Pollution -The Environment (Protection) Act - Air (Prevention and control of pollution) Act - Water (Prevention and control of pollution) Act- Role of individual in prevention of pollution.		
UNIT V	HUMAN POPULATION AND ENVIRONMENT	3
Sustainable development – Urban Population growth and distribution – Population explosion – Family Welfare Program –Women and child welfare- Role of information technology in environment and human health- case studies		

Text / Reference (s) books:

1	Dr.J.P.Sharma, " Environmental studies" , Laxmi Publications(p) Ltd, New Delhi.
2	Miller "Environmental Science" 11th Edition, Cengage Learning India Private Limited, New Delhi, (2006).
3	Master. G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt Ltd., (2004)
4	Dr.A.Ravikrishnan " Environmental Science and Engineering " Sri Krishna publications, Chennai(2015)
5	P.Anandan, R.Kumaravelan "Environmental Science and Engineering" Scitech Publication (India) Pvt. Ltd, Chennai, Reprint 2009.

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Approved By
Board of Science & Humanities
29 MAR 2019
KARUR - 639 113

Regulation 2018		Semester III/ Semester IV	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM103T	INDIAN TRADITION AND HERITAGE	1	0	0	-

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Make students understand the role and impact of culture in human life.
CLR-2	Draw attention towards languages and literatures of ancient period.
CLR-3	Cultivate secularism in students
CLR-4	Equip students with the knowledge of Indian art and architectural evolution over years.
CLR-5	Make students identify Indian culture in abroad.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Understand the meaning of culture, trace the influence and significance of geographical features on Indian culture.
CO2	Develop an awareness of the variety of languages and literatures in India.
CO3	Recognise the characteristics of various religious movements in ancient India.
CO4	Identify the characteristics and various styles of Indian architecture and sculpture at different times.
CO5	Examine various modes through which Indian culture spread abroad.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	2	2	1	2	2	1	2	-	-	-
CO3	-	-	-	-	-	1	1	1	1	1	1	1	-	-	-
CO4	2	2	2	2	2	2	2	2	2	2	1	2	-	-	-
CO5	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO (Avg)	2	2	2	2	2	1.8	1.8	1.6	1.8	1.8	1	1.8	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	HISTORY OF INDIAN CULTURE	2
Characteristics of Indian Culture - Significance of Geography on Indian Culture -Society in India through ages- Ancient Period - Varna and Jati, family and marriage in India - Position of women in ancient India- Contemporary period; Caste system and communalism.		
UNIT II	LITERATURE AND EDUCATION	4
Evolution of script and languages in India : Harappan Script and Brahmi Script, Short History of the Sanskrit Literature: The Vedas, The Brahmanas and Upanishads and Sutras, Epics: Ramayana and Mahabharata&Puranas - History of Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, Sangam Literature and Odia Literature.		
UNIT III	RELIGION AND PHILOSOPHY	4
Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainisim, Indian Philosophy - Vedanta and Mimansa school of Philosophy.		
UNIT IV	ART AND ARCHITECTURE	2
Indian Art & Architecture: Gandhara School and Mathura School of Art; Hindu Temple Architecture, Budhhist Architecture, Medieval Architecture and Colonial Architecture, Indian Painting Tradition, Performing Arts: Divisions of Indian classical music: Hindustani and Carnatic. Dances of India, Rise of modern theatre and Indian cinema.		
UNIT V	SPREAD OF INDIAN CULTURE ABROAD	3
Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia, India, Central Asia and Western World through ages.		
Text Book (s)		
	Nil	
Reference (s)		
Chakravarti, Ranabir: Merchants, Merchandise & Merchantmen, in: Prakash, Om (ed.): *The Trading World of the Indian Ocean, 1500-1800* (*History of Science, Philosophy and Culturein Indian Civilization*, ed. by D.P. Chattopadhyaya, vol. III, 7), Pearson, Delhi, 2012.		

Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC301J	MACHINE LEARNING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Recognize definition, goals and applications of Machine Learning techniques.
2	Understand the concepts of Descriptive Statistics.
3	Apply various machine learning techniques such as Supervised Concepts, Classification, Regression etc.
4	Apply the fundamentals of Unsupervised Learning algorithm in real world application.
5	Understand the fundamentals of Neural Networks and Data Science.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the fundamentals of Machine Learning.
CO2	Demonstrate various concepts of Descriptive Statistics.
CO3	Apply Machine Learning techniques such as Classification, Regression.
CO4	Apply Machine Learning techniques such as Clustering.
CO5	Outline the basics of Neural Networks, Data Science and Deep Learning.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	-	-	2	1	-	1	3	3
CO2	3	2	2	2	2	-	-	-	2	1	-	1	3	2
CO3	3	2	2	2	2	-	-	-	2	1	-	1	3	2
CO4	3	2	2	2	2	-	-	-	2	1	-	1	2	2
CO5	3	2	2	2	2	-	-	-	2	1	-	1	2	2
CO (Avg)	3	2	2	2	2	-	-	-	2	1	-	1	2.60	2.20

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION OF MACHINE LEARNING	9
Definition, Goals and Applications of Machine Learning - Types of Learning Techniques: Supervised, Unsupervised, Semi - supervised and Reinforcement Learning - Aspects of Developing a Learning System: Training Data, Concept Representation, Function Approximation - Examples of Machine Learning Problems - Structure of Learning versus Designing - Training versus Testing- Characteristics of Machine Learning Tasks - Predictive and Descriptive Tasks.		
UNIT II	**DESCRIPTIVE STATISTICS**	**9**
Central tendency: Mean, Median, Mode - Measures of Dispersion: Variance, Standard Deviation- Measures of Shape: Skewnes, kurtosis, Percentile, Five number summary - Data Visualization: Box plot, Histogram, Bar Chart, Pie Chart, Scatter plot - Association Analysis: Covariance, Correlation - Types of Correlation: Pearson Correlation, Spearman Correlation, Kendall Correlation - Two Way Tables, Chi-Squared Test for Two Way Tables.		
UNIT III	**SUPERVISED**	**9**
Supervised Learning: Regression, Simple Linear Regression, Multiple Linear Regression, Logistic Regression - Classification - Decision Tree, k-Nearest Neighbors, Support Vector Machine (SVM).		
UNIT IV	**UNSUPERVISED LEARNING**	**9**
Unsupervised Learning: Clustering Introduction - Distance Measure - Clustering Methods: Partitioning Based clustering, Hierarchical Based clustering, Density Based Clustering, DBSCAN, Grid Based Clustering-Cluster Tendency Assessment-Applications of Clustering.		
UNIT V	**NEURAL NETWORKS AND INTRODUCTION TO DATA SCIENCE**	**9**
Introduction to Neural Networks - Activation Functions - Learning Rate - Stochastic Gradient Descent - Feed forward - Back Propagation - Basics of Deep Learning Networks - Introduction to Data Science - Digital Data - Data Science and its components.		
	LIST OF EXPERIMENTS	**15**

1. Introduction to Machine Learning and Python
2. Data preprocessing using Python
3. Simple Linear Regression
4. Multiple Linear Regression
5. Support Vector Regression (SVR)
6. K-Nearest Neighbors (K-NN)
7. Support Vector Classification (SVC)
8. Random Forest Classification
9. K-Means Clustering
10. Implementation Neural Networks

Text Book (s)

1	Yaser S.Abu Mostafa, Malik Magdon Ismail, Hsuan Tien Lin,"Learning from Data",Kindle Edition 2017.

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Reference (s)	
1	Practical Data Science with R. Author(s): Nina Zumel, John Mount, Manning Shelter Island.ko
2	Data Mining Concepts and Techniques, 3rd Edition. Author(s): J.Han, M Kamber, J Pei.
3	Introduction to Data Mining. Author(s): Pang-Ning Tan, Steinberg, Vipin Kumar.
4	Introduction to Statistical Learning using R. Author(s): Trevor Hastie, Tibshirani.
5	Applied Predictive Modeling. Author(s): by Max Kuhn, Kjell Johnson.

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Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC302T	COMPILER DESIGN	3	1	0	4

Prerequisite Course (s)

18CSS101J / 18CSS101J(R) - Programming for Problem Solving

Course Objective (s):

The purpose of learning this course is to:

1	Learn the various phases of compiler.
2	Learn the various parsing techniques.
3	Understand intermediate code generation.
4	Learn to implement code generator.
5	Learn the various code optimization techniques.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the phases of a compiler and lexical analyzer.
CO2	Identify the similarities and differences among various parsing techniques and grammar transformation techniques.
CO3	Translate given input to intermediate code.
CO4	Apply the techniques for code generation.
CO5	Identify the various types of optimizations for language transformation.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	3	1	-	-	3	2
CO2	3	3	3	1	-	-	-	-	3	1	-	-	3	2
CO3	3	2	1	-	-	-	-	-	3	1	-	-	3	2
CO4	3	3	2	-	-	-	-	-	3	-	-	-	3	2
CO5	3	3	3	1	-	-	-	-	3	-	-	-	3	2
CO (Avg)	3	2.6	2	1	-	-	-	-	3	1	-	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO COMPILER	9 + 3
Introduction to Compiler - Analysis of the Source Program - The Phases of Compiler - Compiler Construction Tools - Lexical Analyzer - Input Buffering - Specification of Tokens - Recognition of Tokens.		
UNIT II	**SYNTAX ANALYSIS**	**9 + 3**
Syntax analysis: The Role of the Parser - Top Down Parsing - Recursive Descent Parser , Predictive Parser - LL(1) Parser, Bottom Up Parsing - Shift Reduce Parser - Operator Precedence Parser - LR Parsers - Constructing SLR Parsing Table.		
UNIT III	**INTERMEDIATE CODE GENERATION**	**9 + 3**
Intermediate Languages – Declarations - Assignment Statements - Boolean Expressions - Flow of Control Statements - Back Patching - Procedure Calls.		
UNIT IV	**CODE GENERATION**	**9 + 3**
Issues in the Design of a Code Generator - Target Machine - Basic Block and Flow Graphs - Next use Information - Simple Code Generator - Register Allocation and Assignment - The DAG Representation of Basic Blocks - Generating Code from DAGs.		
UNIT V	**CODE OPTIMIZATION**	**9 + 3**
Principle Sources of Optimization - Peephole Optimization - Optimization of Basic Blocks - Loops in Flow Graphs - Introduction to Global Data - Flow Analysis - Code Improving Transformations.		

Text Book (s)

1	Alfred V. Aho, Ravi Sethi Jeffrey D.Ullman, —Compilers: Principles, Techniques and Tools,Pearson Education, 2011.

Reference (s)

1	David Galles ,Modern compiler design, Pearson Education, 2008.
2	Steven S.Muchnick,Advanced compiler Design & implementation —Morgan Kaufmann Publishers, 2000.
3	Charles N.Fischer, Richard. J.LeBlanc,—Crafting a compiler with C, Pearson Education, 2008.

Regulation 2018		Semester V	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM301L	ANALYTICAL AND LOGICAL THINKING SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Sharpen problem solving skills and to improve thinking capability of the students
2	Drive the students to use language with great commitment and cooperation
3	Expertise the creative thinking and presentation skills to meet the company needs

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in a fruitful manner
CO2	Organize and convey the information in such an incomparable way
CO3	Improve their presentation skills

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	2	-	-	-			
CO3	-	-	-	-	-	-	-	-	-	2	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	2.00	2.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Module - 1	6
Aptitude: Alligations or Mixtures - Blood Relations. **Communication:** How to set Goals - Interpersonal Relationships - JOHARI Window - Work & Business Etiquette		
UNIT II	**Module - 2**	**6**
Aptitude: Partnership - Statement and Assumptions. **Communication:** Transition to Corporate World - Career opportunities in Various Sectors and know your industry.		
UNIT III	**Module - 3**	**6**
Aptitude: Arithmetic and Geometric Progressions - Syllogisms. **Communication:** Time Management - Anger and Stress Management - Conflict Management.		
UNIT IV	**Module - 4**	**6**
Aptitude: Permutations and Combinations - Statements & Conclusions. **Communication:** Launch a Product - Telephonic Etiquette.		
UNIT V	**Module - 5**	**6**
Aptitude: Geometric Problems. **Communication:** Presentation Skills - Oral presentation and public speaking skills, Business presentations.		

Text Book (s)	
1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

Regulation 2018		Semester V/ VI	Total Hours			15
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18LEM301T	INDIAN ART FORMS (Common to all UG Programmes)	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Introduce the learners to various art forms and whet their aesthetics sense.
CLR-2	Improve learners' knowledge on history of theatre and drama and draw connections between theatrical practices and social contexts in both modern and pre modern periods..
CLR-3	Enable the learners to identify and understanding various types of dance and music concepts
CLR-4	Make learners explore the diversity of Architecture, Sculpture, Painting and its intersection with community, culture and society.
CLR-5	Make students to get familiarized with the formal, historical, and theoretical aspects of literary arts.

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Identify aesthetics traits found throughout Indian art.
CO2	Demonstrate understanding of the social and artistic movements that have shaped theatre and dance.
CO3	Recognize different concepts involved in music and dance.
CO4	Identify and appreciate the salient features and various styles of Indian Architecture, Sculpture and Painting at different times.
CO5	Demonstrate a broad understanding of Indian literary arts and appreciate the role that historical context plays in the creation and interpretation of literary works

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO3	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO4	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO5	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	1	2	2	1.6	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INDIAN ARTS	3
Introduction to art (aesthetics, taste)- fine arts - applied arts –Terminology - Subject matter -Art as propaganda - Purposes/uses of art.		
UNIT II	**THEATRE & DRAMA**	**3**
History of Theatre and Drama- Traditional Theatre forms- Modern Theatre and its characteristics- Puppetry –different forms and elements of drama.		
UNIT III	**MUSIC AND DANCES**	**3**
Origin of Music and Dance- Classical music and Carnatic Music- Regional Music -Musical Instruments-Regional Classical Dances.		
UNIT IV	**ARCHITECTURE, SCULPTURE, PAINTING**	**3**
History of architecture, sculpture, painting -Indo-Islamic Architecture- Temple Architecture– different types of Sculptures and its characteristics-Painting and its different styles.		
UNIT V	**LITERARY ARTS**	**3**
Ancient Indian Literature- Early Dravidian Literature- Medieval Literature- Modern Indian Literature-Contemporary Literature.		

Text Book (s)

	NIL

Reference (s)

1	Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Print world and National Museum Institute (Introduction).
2	Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
3	Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
4	Mitter, Partha, Indian Art, Oxford History of Art series, Oxford University Press, 2001

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Regulation 2018		Semester V/VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM302T	SELF DEVELOPMENT AND ENTREPRENEURSHIP	1	0	0	Nil

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Develop entrepreneurship and self-employment abilities to start any venture plan, use, and monitor and control resources optimally and economically.
2	Know the Micro, small and medium industries Registration Process.
3	Study about product selection and development.
4	Learn about the Project report preparation.
5	Analysis the Enterprise risk management.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify entrepreneurial quality.
CO2	Know the entrepreneurial support agencies.
CO3	Prepare project setup planning and project report
CO4	Select appropriate agencies for technical and financial support.
CO5	Explain SWOT analysis and strategies to achieve goals.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	1	-	-	1	1	1	1	-	-
CO2	-	1	-	-	-	2	1	1	1	2	2	1	-	-
CO3	1	3	-	-	-	-	2	1	1	1	2	1	-	-
CO4	-	1	-	-	-	1	2	1	1	1	2	1	-	-
CO5	2	1	-	-	-	-	1	-	1	1	1	1	-	-
CO (Avg)	1.50	1.50	-	-	-	1.33	1.50	1.00	1.00	1.20	1.60	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Management Studies On 23 OCT 2020 KARUR - 639 113

UNIT I	INTRODUCTION TO SELF-EMPLOYMENT AND ENTREPRENEURSHIP DEVELOPMENT	6
Introduction of self-employment – Characteristics- Creativity. Entrepreneurship development-Qualities of entrepreneur and Characteristics of Diploma holder as a self-employer like developing networking and personal contacts, importance of productivity, quality, cost consciousness and customers' satisfaction. Types of enterprise-Sole partnership -Partnership firm- Joint stock company- Co-operative society.		
UNIT II	**ENTREPRENEURIAL SUPPORT AGENCIES**	**6**
Definition – Micro, small and medium industries- Registration process of an enterprise with Government agencies-Name, type and role of state and national level support agencies. Current state & National Level Promotional Schemes for establishment of new.		
UNIT III	**PROJECT SET UP PLANNING**	**6**
Product Selection: importance- Product development stages. Process Selection: Factors affecting process selection - Technology lifecycle. Process Conversion-Capacity Planning: Basic method to assess / estimate capacity. Selection of location and layouts: Factors affecting selection of location - Objectives and types of plant layout.		
UNIT IV	**PROJECT PROPOSAL PLANNING**	**6**
7-M resources- Marketing- definition, need for enterprise, 4Ps channels- Market survey. Methods - Project report preparation for mechanical feature based product: Meaning of project planning and report: Feasibility study. Details required for preparing project plan. Project cost estimation.		
UNIT V	**ENTERPRISE AND RISK MANAGEMENT**	**6**
Concept of risk in the context of enterprise/ project-Uncertainty and certainty of project elements-Decision making under risk-Methods of risk management-Strength, Weakness, Opportunity and Threat (SWOT) analysis.		

Reference (s)

1	Entrepreneurship & Venture Management, Clifford and Bombak, JosephR.Momanso.
2	Small Industries management – Karmakar.M.B.
3	Creativity --Pradeep Khandwala
4	Entrepreneurship development and Management, R.K.Singal, S.K.Kataria Sons.

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Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH201T	MANAGEMENT PRINCIPLES FOR ENGINEERS	2	0	0	2

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Enable the students to study the evolution of management.
2	Study about planning tools and techniques in management for engineers.
3	Learn about career planning for engineers.
4	Enable the effective and barriers communication in the organization.
5	Study the system and process of effective controlling in the organization.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Acquired the knowledge on fundamental concept of management and its various functions.
CO2	Gained knowledge on planning and decision making process.
CO3	Attained the knowledge of organization structure and career planning.
CO4	Demonstrate the ability to directing, leadership and communicate effectively.
CO5	Analysis isolates issues and formulates best control methods.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	-	-	1	-	1	2	-	-
CO2	2	2	-	-	-	1	-	-	1	1	1	1	-	-
CO3	2	-	-	-	-	1	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	1	-	-	1	1	1	-	-	-
CO5	2	-	-	-	-	1	-	-	-	1	1	3	-	-
CO (Avg)	1.80	2.00	-	-	-	1.00	-	-	1.00	1.00	1.00	2.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO MANAGEMENT PRINCIPLES	6
Meaning, Definition of Management – Managerial Role - POSDCORB -Management vs. Administration- Evolution of Management Thoughts- Henry Fayol's 14 Principles- Opportunities and Challenges in Management.		
UNIT II	**PLANNING**	**6**
Nature and purpose of planning – Planning process – Types of planning – Objectives – Setting - Objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.		
UNIT III	**ORGANIZING**	**6**
Nature and purpose – Formal and informal organization – organization chart – Organization Structure– Types – Line and staff authority – Departmentalization – Delegation of Authority – Centralization and Decentralization – Job Design.		
UNIT IV	**DIRECTING**	**6**
Foundations of individual and group behavior – Motivation – Motivation Theories – Motivational - Techniques –Leadership – Types and Theories of Leadership – Communication – Process of Communication – Barrier in Communication – Effective Communication.		
UNIT V	**CONTROLLING**	**6**
System and Process of Controlling – budgetary and Non-Budgetary Control Techniques – Use of Computers and IT in Management control – Control and performance – Direct and Preventive control – Reporting.		

Reference (s)

1	P.C.Tripathi., P.N Reddy, Principles of Management, McGraw Hill, 5th Edition 2012.
2	Harold Koontz, Heinz Weihrich, A RamachandraAryasri, Tata McGraw Hill, Principles of Management, 2016
3	Charles W Hill, Stephen L Mcshane, Principles of Management, McGraw Hill, Special Indian Edition 2007.
4	1.Stephen A. Robbins & David A. Decenzo& Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011.
5	Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.

Regulation 2018		Semester VI	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC303J	WEB PROGRAMMING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basic and programming concepts of web technology.
2	Understand the importance of Scripting Languages.
3	Explore the knowledge in HTML, XML, Node.js, PHP, Servlet and JSP.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Build web pages using HTML and Cascading Style Sheets.
CO2	Build Dynamic Web Pages using JavaScript, XML and Node.js.
CO3	Develop Dynamic Web Page using Servlet and JSP.
CO4	Develop Client Server application with Database Connectivity using PHP.
CO5	Describe different methodologies of Web Services.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	3	-	-	-	-	-	2	-	-	-	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	2	-	-	-	-	-	2	-	-	-	3	2
CO5	3	2	2	-	-	-	-	-	-	-	-	-	3	2
CO (Avg)	3	2.60	2.40	-	-	-	-	-	2	-	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	HTML AND CSS	7
HTML - Basic HTML Tags - List Tags - Table Tags - Frameset - CSS - Inline - Internal - External CSS - Border - Margin - Padding.		
UNIT II	**CLIENT SIDE SCRIPTING LANGUAGE , XML AND NODE JS**	**11**
Introduction to JavaScript - Data types – Operators - Objects - Loops - Built-in Objects - DOM Events - Regular Expression - Validation - Basic XML - DTD - Introduction to Node JS - Modules - HTTP Module - File System.		
UNIT III	**SERVLET AND JSP**	**9**
Java Servlet - Servlet Lifecycle - GET and POST Method - Sessions - Cookies - JSP - Expressions - Scriptlets - Declarations - JSTL.		
UNIT IV	**PHP**	**9**
Introduction to PHP - Variables - Built-In Functions - Connecting to MySQL Database - Session Variables - Cookies - Building Web Applications.		
UNIT V	**INTRODUCTION TO WEB SERVICES**	**9**
Definition - Web Services - Basics - Service Roles - Architectural Process - WSDL - SOAP - RESTFUL - Micro Service Architecture.		
	LIST OF EXPERIMENTS	**15**

1. Create a simple webpage using HTML Semantic and Structural Elements
2. Create a simple college website using Internal and External CSS
3. Design a dynamic web page with validation using JavaScript
4. Design a web page with forms to compare dates
5. Create a simple application using servlet
6. Create a simple web page using JSP
7. Write XML DTD to validate the XML file
8. Create your own modules, and easily include them in your applications using Node JS
9. Interact with the file system, and serve a web page from a file using Node JS
10. Design a simple web page using PHP

Text Book (s)

1	Jeffrey C Jackson, "Web Technology - A computer Science perspective", Pearson Education, 2007.
2	Chris Bates, "Web Programming - Building Internet Applications", Wiley India, 2006.

Reference (s)

1	David Chappell," Java Web Services", O'Reilly, 2002.
2	Deitel, Nieto, Lin and Sadhu —"XML How to Program, first edition, Pearson Education", USA, 2002.

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Regulation 2018		Semester VI	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18CSC304J	BIG DATA AND ANALYTICS (Recommended by Infosys)	2	0	4	4

Prerequisite Course (s)

18CSC202J - Object Oriented Programming
18CSC205J - Database Management Systems

Course Objective (s):
The purpose of learning this course is to:

1	Understand the fundamental concepts of Big Data and Analytics.
2	Recognize the key concepts of Hadoop framework, MapReduce, Pig and Hive.
3	Explore tools and practices for working with Big Data.

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Explain the concepts of Big Data and Analytics.
CO2	Explain the working procedure of Hadoop ecosystem.
CO3	Make use of MapReduce Framework and Pig Scripting to process real time data.
CO4	Explain different forms of databases used in Big Data.
CO5	Apply the concepts of Big Data to solve real world problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	1	2	2	-	1	3	2
CO2	3	2	-	-	-	-	-	1	2	2	-	1	3	2
CO3	3	2	2	2	2	1	-	1	2	2	1	2	3	3
CO4	3	2	-	-	-	-	-	1	2	2	-	2	3	3
CO5	3	2	2	2	2	-	-	1	2	2	1	2	3	3
CO (Avg)	3	2	2	2	2	1	-	1	2	2	1	1.60	3	2.60

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO BIG DATA ANALYTICS	6
Introduction to Big Data - Big Data characteristics - Objectives and Applications - Drivers for Big Data - Challenges for processing Big Data - Importance of Analytics in Big Data - Classification of Analytics - Top Analytics Tools.		
UNIT II	**HADOOP ECOSYSTEM**	**6**
Hadoop Ecosystem - Hadoop Execution Environment - Hadoop Distributed File System (HDFS) - HDFS Architecture and Configuration - Processing data in Hadoop - Data Storage in HDFS - HDFS Access - Commands - APIs - Applications.		
UNIT III	**MAPREDUCE FRAMEWORK AND PIG**	**6**
MapReduce Framework - Architecture - Working of MapReduce - Mapper - Reducer - Partitioner - Counter - MapReduce Programming Model - Introduction to Apache Pig: Basic Latin commands - Keywords - Data Types - Operators - UDF statements - Load/Store Functions.		
UNIT IV	**DATABASES OF HADOOP**	**6**
Introduction to Apache Hive - Hive Architecture - Managing Tables - Data types and Schemas - Partitions and Buckets - NoSql Databases: Introduction to Cassandra, Features and Data Types, CRUD, Collections - Introduction to MongoDB - Data Types, CRUD, MongoDB shell.		
UNIT V	**ADVANCED BIG DATA TECHNOLOGIES AND APPLICATIONS**	**6**
Introduction to Spark and kafka - Spark Ecosystem - Spark - Streaming - Resilient Distributed Datasets and Transformations - Spark using python (PySpark) - Analysis of Big Data: Twitter data - E-Commerce data - Blogs data.		
	LIST OF EXPERIMENTS	**30**

1. Installation of Hadoop
2. HDFS setup and Hadoop shell commands
3. MapReduce – running word count program
4. Stop word elimination problem
5. MapReduce program to mine weather dataset
6. Pig installation and scripting operations
7. Hive installation and database operations
8. CRUD operations in MongoDB
9. CRUD operations in Cassandra
10. Data Analytics using Apache Spark

Text Book (s)

1	Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publication, First edition, 2016

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Reference (s)	
1	Tom White, Hadoop The Definitive Guide, First Edition. O'Reilly, 2015
2	Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics, John Wiley & sons, 2012
3	Glenn J. Myatt, Making Sense of Data, John Wiley &Sons, Pete Warden, Big Data Glossary, O'Reilly, 2011
4	Holden Karau, Andy Konwinski, Patrick Wendell, MateiZaharia, Learning Spark: Lightning-Fast Big Data Analysis, O'Reilly, 2015
5	Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk, Bruce Brown, Hadoop for Dummies, Wiley Publications, 2014

Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM302L	EMPLOYABILITY SKILLS AND PRACTICES	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	Learn the application of mathematical or statistical models to different real-world contexts
2	Focus on writing & speaking skills through vigorous practices.
3	Enhance soft skills and analytical ability of students
4	Defeat the fear while communicating in group and to master the effective communication

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in a productive manner
CO2	Launch their ability of comprising and delivering the information
CO3	Upgrade their communication quality in near future

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-			
CO2	-	-	-	-	-	-	-	-	3	-	-	-			
CO3	-	-	-	-	-	-	-	-	-	3	-	-			
CO4	-	-	-	-	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			
CO (Avg)	3.00	-	-	-	-	-	-	-	3.00	3.00	-	-			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Module - 1	6
Aptitude: Time and Distance (Speed, Streams) - Problems on Trains - Arrangements and BloodRelations. **Communication:** Job Application - Cover letter,Bio-data,Resume& CV building.		
UNIT II	Module - 2	6
Aptitude: Time and Work - Pipes & Cisterns - Situation Reaction Test & Data Interpretations. **Communication:** Writing practices on circulars, notices, memos, Agenda preparation and Minutes of meeting.		
UNIT III	Module - 3	6
Aptitude: Ages - Averages - Probability - Profit and Loss. **Communication:** Email Etiquette - Essay writing.		
UNIT IV	Module - 4	6
Aptitude: Mensuration - SI & CI - Cause and Effect Analysis - Statement, Assumptions & Conclusions. **Communication:** Group Discussion and guidelines.		
UNIT V	Module - 5	6
Aptitude: Permutation and Combinations - Partnership - Alligations or Mixtures. **Communication:** Interview skills - General instructions, Review of interview questions, Mock Interviews.		

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

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Regulation 2018		Semester V/ VI	Total Hours			15
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18LEM301T	INDIAN ART FORMS (Common to all UG Programmes)	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Introduce the learners to various art forms and whet their aesthetics sense.
CLR-2	Improve learners' knowledge on history of theatre and drama and draw connections between theatrical practices and social contexts in both modern and pre modern periods..
CLR-3	Enable the learners to identify and understanding various types of dance and music concepts
CLR-4	Make learners explore the diversity of Architecture, Sculpture, Painting and its intersection with community, culture and society.
CLR-5	Make students to get familiarized with the formal, historical, and theoretical aspects of literary arts.

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Identify aesthetics traits found throughout Indian art.
CO2	Demonstrate understanding of the social and artistic movements that have shaped theatre and dance.
CO3	Recognize different concepts involved in music and dance.
CO4	Identify and appreciate the salient features and various styles of Indian Architecture, Sculpture and Painting at different times.
CO5	Demonstrate a broad understanding of Indian literary arts and appreciate the role that historical context plays in the creation and interpretation of literary works

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO3	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO4	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO5	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	1	2	2	1.6	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	**INDIAN ARTS**	3
Introduction to art (aesthetics, taste)- fine arts - applied arts –Terminology - Subject matter -Art as propaganda - Purposes/uses of art.		
UNIT II	**THEATRE & DRAMA**	3
History of Theatre and Drama- Traditional Theatre forms- Modern Theatre and its characteristics- Puppetry –different forms and elements of drama.		
UNIT III	**MUSIC AND DANCES**	3
Origin of Music and Dance- Classical music and Carnatic Music- Regional Music -Musical Instruments-Regional Classical Dances.		
UNIT IV	**ARCHITECTURE, SCULPTURE, PAINTING**	3
History of architecture, sculpture, painting -Indo-Islamic Architecture- Temple Architecture– different types of Sculptures and its characteristics-Painting and its different styles.		
UNIT V	**LITERARY ARTS**	3
Ancient Indian Literature- Early Dravidian Literature- Medieval Literature- Modern Indian Literature-Contemporary Literature.		

Text Book (s)

	NIL

Reference (s)

1	Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Print world and National Museum Institute (Introduction).
2	Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
3	Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
4	Mitter, Partha, Indian Art, Oxford History of Art series, Oxford University Press, 2001

Regulation 2018		Semester V/VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM302T	SELF DEVELOPMENT AND ENTREPRENEURSHIP	1	0	0	Nil

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Develop entrepreneurship and self-employment abilities to start any venture plan, use, and monitor and control resources optimally and economically.
2	Know the Micro, small and medium industries Registration Process.
3	Study about product selection and development.
4	Learn about the Project report preparation.
5	Analysis the Enterprise risk management.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify entrepreneurial quality.
CO2	Know the entrepreneurial support agencies.
CO3	Prepare project setup planning and project report
CO4	Select appropriate agencies for technical and financial support.
CO5	Explain SWOT analysis and strategies to achieve goals.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	1	-	-	1	1	1	1	-	-
CO2	-	1	-	-	-	2	1	1	1	2	2	1	-	-
CO3	1	3	-	-	-	-	2	1	1	1	2	1	-	-
CO4	-	1	-	-	-	1	2	1	1	1	2	1	-	-
CO5	2	1	-	-	-	-	1	-	1	1	1	1	-	-
CO (Avg)	1.50	1.50	-	-	-	1.33	1.50	1.00	1.00	1.20	1.60	1.00		

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO SELF-EMPLOYMENT AND ENTREPRENEURSHIP DEVELOPMENT	6
Introduction of self-employment – Characteristics- Creativity. Entrepreneurship development-Qualities of entrepreneur and Characteristics of Diploma holder as a self-employer like developing networking and personal contacts, importance of productivity, quality, cost consciousness and customers' satisfaction. Types of enterprise-Sole partnership -Partnership firm- Joint stock company- Co-operative society.		
UNIT II	**ENTREPRENEURIAL SUPPORT AGENCIES**	**6**
Definition – Micro, small and medium industries- Registration process of an enterprise with Government agencies-Name, type and role of state and national level support agencies. Current state & National Level Promotional Schemes for establishment of new.		
UNIT III	**PROJECT SET UP PLANNING**	**6**
Product Selection: importance- Product development stages. Process Selection: Factors affecting process selection - Technology lifecycle. Process Conversion-Capacity Planning: Basic method to assess / estimate capacity. Selection of location and layouts: Factors affecting selection of location - Objectives and types of plant layout.		
UNIT IV	**PROJECT PROPOSAL PLANNING**	**6**
7-M resources- Marketing- definition, need for enterprise, 4Ps channels- Market survey. Methods - Project report preparation for mechanical feature based product: Meaning of project planning and report: Feasibility study. Details required for preparing project plan. Project cost estimation.		
UNIT V	**ENTERPRISE AND RISK MANAGEMENT**	**6**
Concept of risk in the context of enterprise/ project-Uncertainty and certainty of project elements-Decision making under risk-Methods of risk management-Strength, Weakness, Opportunity and Threat (SWOT) analysis.		

Reference (s)

1	Entrepreneurship & Venture Management, Clifford and Bombak, JosephR.Momanso.
2	Small Industries management – Karmakar.M.B.
3	Creativity --Pradeep Khandwala
4	Entrepreneurship development and Management, R.K.Singal, S.K.Kataria Sons.

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Regulation 2018		Semester VII	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH202T	SOCIAL ENGINEERING	2	0	0	2

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Learn about fundamental concept of social engineering
2	Know the different elements of ethical hacking and social engineering.
3	Understand the concepts of threats and attack vectors
4	Understand the ethical hacking
5	Learn about the attacks against individuals and organizations

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the concept of social engineering and types of attacks.
CO2	Identify the key security concepts, CIA and IT governance and best practices
CO3	Understand principles of social engineering.
CO4	Exhibit the ethical hacking concepts and scopes, threats and attack vectors and common areas of vulnerability.
CO5	Gain knowledge of attacks against individuals and organizations.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	1	1	1	1	1	-	1	-	-
CO2	1	1	-	-	-	2	-	2	1	-	-	1	-	-
CO3	-	1	-	-	-	-	1	2	1	-	-	1	-	-
CO4	-	-	-	-	-	-	-	3	-	-	-	1	-	-
CO5	1	1	-	-	-	-	-	-	1	1	-	1	-	-
CO (Avg)	1.33	1.25	-	-	-	1.50	1.00	2.00	1.00	1.00	-	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO SOCIAL ENGINEERING	6
Social Engineering Defined - Why Does Social Engineering Work - Identify Communication Style - key aspects of social engineering - Categories of Social Engineering Attacks – human – based attacks and technology - based attacks		
UNIT II	**KEY SECURITY**	**6**
Key security - concepts - Types of key security concepts – Cyber security position. The CIA Triad - the significance of incident response and frameworks around cyber security. IT Governance - Best practices - compliance.		
UNIT III	**PSYCHOLOGY OF SOCIAL ENGINEERING**	**6**
Mind Tricks: Psychological Principle - Four fundamental aspects of human nature that social engineers - the desire to be helpful - the tendency to be trusting - the fear of offending others - the tendency to cut corners		
UNIT IV	**ETHICAL HACKING AND SOCIAL ENGINEERING**	**6**
Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modelling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defence Strategies. Common Areas of Vulnerability - Appropriate access - Assessed resistance - Information availability		
UNIT V	**CASES OF SOCIAL ENGINEERING**	**6**
Notable Cases of Social Engineering - Attacks against Individuals - Attacks against Organizations - Preventing Social Engineering Attacks - Mitigating the Damage of Social Engineering Attacks - Segregation of Access - Maintain Access Logs - Ensure That Backups Occur Regularly - Automatically Revoke User Privileges If Suspicious Activity Is Detected		

Reference (s)

1	Kevin D. Mitnick, William L. Simon, Steve Wozniak, The Art of Deception: Controlling the Human Element of Security, Wiley, October 17th 2003
2	Christopher Hadnagy, Social Engineering: The Science of Human Hacking Paperback- Wiley Publishing Inc.,Edition 2018
3	Lester Evans, Cybersecurity: An Essential Guide to Computer and Cyber Security for Beginners, Including Ethical Hacking, Risk Assessment, Social Engineering, Attack and Defense Strategies, and Cyberwarfare Paperback –2018
4	Dr. Erdal Ozkaya, Learn Social Engineering: Learn the art of human hacking with an internationally renowned expert-2018

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE001T	ADHOC AND SENSOR NETWORKS	3	0	0	3

Prerequisite Course (s)

18CSC206J - Computer Networks

Course Objective (s):

The purpose of learning this course is to:

1	Understand the design issues in AdHoc and Sensor Networks.
2	Learn the different types of MAC protocols.
3	Discuss different types of AdHoc Routing Protocols.
4	Understand the architecture of Wireless Sensor Networks and MAC protocol.
5	Learn issues in Wireless Sensor Networks and QoS.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the concepts, network architectures and applications of AdHoc and Wireless Sensor Networks.
CO2	Describe the protocol design issues of AdHoc and Sensor Networks.
CO3	Design routing protocols for AdHoc and Wireless Sensor Networks with respect to some protocol design issues.
CO4	Explain hardware and software components of AdHoc and Sensor Networks.
CO5	Evaluate the QoS related performance measurements of AdHoc and Sensor Networks.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO2	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO3	2	2	2	-	-	-	-	1	1	1	-	1	2	1
CO4	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO5	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO (Avg)	3	2	2	-	-	-	-	1	1	1	-	1	2	1

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Fundamentals of Wireless Communication Technology - The Electromagnetic Spectrum - Radio Propagation Mechanism - Characteristics of the Wireless Channel - Mobile AdHoc Networks (MANETs) and Wireless Sensor Networks (WSNs) : Concepts and Architectures - Applications of AdHoc and Sensor Networks - Design Challenges in AdHoc and Sensor Networks.		
UNIT II	**MAC PROTOCOLS FOR ADHOC WIRELESS NETWORKS**	**9**
Issues in designing a MAC Protocol - Classification of MAC Protocols - Contention based Protocols - Contention based Protocols with Reservation Mechanisms - Contention based Protocols with Scheduling Mechanisms - Multi channel MAC - IEEE 802.11.		
UNIT III	**ROUTING PROTOCOLS AND TRANSPORT LAYER IN ADHOC WIRELESS NETWORKS**	**9**
Issues in designing a routing and Transport Layer protocol for AdHoc Networks - proactive routing, reactive routing (on-demand), hybrid routing - Classification of Transport Layer Solutions - TCP over AdHoc Wireless Networks.		
UNIT IV	**WIRELESS SENSOR NETWORKS (WSN) AND MAC PROTOCOLS**	**9**
Single node architecture: Hardware and Software components of a Sensor Node - WSN Network Architecture: typical network architectures - Data relaying and aggregation strategies - MAC layer protocols: Self-organizing, Hybrid TDMA / FDMA and CSMA based MAC - IEEE 802.15.4.		
UNIT V	**WSN ROUTING, LOCALIZATION & QOS**	**9**
Issues in WSN Routing - OLSR - Localization - Indoor and Sensor Network Localization - Absolute and Relative Localization, Triangulation - QOS in WSN - Energy Efficient Design - Synchronization - Transport Layer issues.		

Text Book (s)

1	C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

Reference (s)

1	Carlos De MoraisCordeiro, Dharma PrakashAgrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2	Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication – 2002.
3	Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
4	KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
5	Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE002T	AGILE METHODOLOGY (Recommended by TCS)	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basic concepts of Agile based Software Development.
2	Gain knowledge in the area of various Agile Methodologies.
3	Gain Knowledge in Agile Testing.
4	Awareness of Jile Product.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the fundamentals of SDLC Models and Agile Software Development.
CO2	Understand the concepts of Agile Scrum Framework.
CO3	Perform Testing Activities within an Agile Project.
CO4	Summarize Agile Software Design Development and Industry Trends.
CO5	Gain practical knowledge of a tool that implements Agile Methodology– JILE.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	1	-	1	1	2	2	2	1	2	2	2
CO2	3	2	2	2	2	1	-	2	2	2	1	2	2	2
CO3	3	2	1	1	2	1	1	-	-	-	-	2	2	2
CO4	3	1	1	-	-	-	-	2	2	2	1	2	2	2
CO5	3	3	3	3	3	1	1	3	3	3	3	3	3	3
CO (Avg)	3	2	1.75	1.75	2.33	1	1	2.25	2.25	2.25	1.5	2.20	2.20	2.20

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FUNDAMENTALS OF AGILE	9
Software Development models - Comparison between Agile and Generic Models - The Genesis of Agile - Introduction and Background - Agile Manifesto and Principles - Overview of Scrum - Extreme Programming - Feature Driven Development - Lean Software Development - Agile Project Management - Design and Development Practices in Agile projects - Test Driven Development - Continuous Integration - Refactoring - Pair Programming - Simple Design - User Stories.		
UNIT II	**AGILE SCRUM FRAMEWORK**	**9**
Introduction to Scrum - Project phases - Agile Estimation - Planning Game - Product backlog - Sprint backlog - Iteration planning - User Story definition - Characteristics and Content of User Stories - Acceptance Test and Verifying Stories - Project Velocity - Burn down chart - Sprint Planning and Retrospective - Daily Scrum - Scrum Roles - Product Owner - Scrum Master - Scrum Team - Scrum Case study - Tools for Agile project management.		
UNIT III	**AGILE TESTING**	**9**
The Agile lifecycle and its impact on Testing - Test Driven Development (TDD) - xUnit Framework and Tools for TDD - Testing User Stories-Acceptance Test and Scenarios - Planning and Managing Testing Cycle - Exploratory Testing - Risk based Testing - Regression Test - Test Automation - Tools to support the Agile Tester.		
UNIT IV	**AGILE SOFTWARE DESIGN AND INDUSTRY TRENDS**	**9**
Agile Software Design and Development: Continuous Integration/Deployment - Automated Build Tools - Version Control - Agile Design Practices: Role of Design Principles - Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principle , Dependency Inversion Principle - Industry Trends: Market Scenario and Adaption of Agile - Agile ALM - Agile in Distributed Teams - Agile Rapid Development Technologies.		
UNIT V	**IMPLEMENTING AGILE USING JILE**	**9**
What is Jile? Understanding Jile and its features- Implementing Case Study using Jile		

Text Book (s)

1	Ken Schawber, Mike Beedle," Agile Software Development with Scrum", Pearson Edition 1, 2008.
2	Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley, 2008.
3	Robert C. Martin," Agile Software Development, Principles, Patterns and Practices", Pearson Edition 1, 2013.

Reference (s)

1	Richard Fairley, "Software Engineering Concepts" –, Tata Mcgraw Hill, 2008.
2	Alistair Cockburn, "Agile Software Development", Second Edition, Pearson Education Asia, 2006.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE003T	ARTIFICIAL INTELLIGENCE AND ROBOTICS	3	0	0	3

Prerequisite Course (s)

18CSC301J - Machine Learning

Course Objective (s):

The purpose of learning this course is to:

1	Study the concepts of Artificial Intelligence.
2	Learn the methods of solving problems using Artificial Intelligence.
3	Introduce the concepts of Expert Systems and Machine Learning.
4	Learn about planning and reasoning Artificial Intelligence.
5	Solve the risk in Artificial Intelligence.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify the problems that are amenable to solution by Artificial Intelligence methods.
CO2	Identify appropriate Artificial Intelligence methods to solve a given problem.
CO3	Formalise a given problem in the language/framework of different Artificial Intelligence methods.
CO4	Implement basic Artificial Intelligence algorithms.
CO5	Identify appropriate Robotics basic methods to solve a given problem.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	2	1	-	1	3	3
CO2	3	2	2	2	-	-	-	-	2	1	-	1	3	2
CO3	3	2	2	2	-	-	-	-	2	1	-	1	3	2
CO4	3	2	2	2	-	-	-	-	2	1	-	1	2	2
CO5	3	2	2	2	-	-	-	-	2	1	-	1	2	2
CO (Avg)	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**1**	**-**	**1**	**2.60**	**2.20**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	SCOPE OF ARTIFICIAL INTELLIGENCE	9
Games theorem - Natural Language Processing - Vision and Speech processing – Robotics - Expert Systems – Types of Artificial Intelligence - Artificial Intelligence Techniques - Search Knowledge, Abstraction.		
UNIT II	**PROBLEM SOLVING TECHNIQUES**	**9**
State Space search: Production systems - Search space control: Depth First Search, Breadth First Search, and Heuristic Search - Hill climbing, Best-first search - Branch and Bound - Problem Reduction - Constraint Satisfaction End - Means-End Analysis.		
UNIT III	**KNOWLEDGE REPRESENTATION**	**9**
Predicate Logic: Unification, Modus pones, Resolution, Dependency Directed Backtracking - Rule based Systems: Forward Reasoning, Conflict Resolution, Backward Reasoning, Use of number of Backtracks - Structured Knowledge Representation: Semantic Net Slots, Exceptions and Default frames, Conceptual Dependency, Scripts.		
UNIT IV	**HANDLING UNCERTAINTY AND LEARNING**	**9**
Non-Monotonic Reasoning - Probabilistic Reasoning - Use of certainty factors - Fuzzy Logic - Concept of Learning - Learning Automation - Genetic Algorithm - Learning by Inductions - Neural networks.		
UNIT V	**ROBOTICS**	**9**
Robot Classification - Robot Specification - Notation Direct and Inverse Kinematics: Co-ordinates Frames, Rotations and Homogeneous Coordinates.		

Text Book (s)

1	Stuart Russell, Peter Norvig, "Artificial Intelligence: A modern approach", Pearson Education, India2003.
2	George Lugar, .Al-Structures and Strategies for and Strategies for Complex Problem solving, 4/e, 2002, Pearson Educations.

Reference (s)

1	Negnevitsky, M, "Artificial Intelligence: A guide to Intelligent Systems",. Harlow: Addison-Wesley, 2002.
2	N.J. Nilsson, "Principles of AI", Narosa Publ. House, 2000.
3	Robin R Murphy, Introduction to AI Robotics PHI Publication, 2000
4	David Jefferis, "Artificial Intelligence: Robotics and Machine Evolution", Crabtree Publishing Company, 1992.
5	D. W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE004T	BIOINFORMATICS	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn about the Bioinformatics.
2	Study about Visualization Techniques.
3	Have good knowledge in Data Mining and Pattern Matching Techniques used in Bioinformatics.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the introductory concepts of Bioinformatics.
CO2	Summarize the concepts of Search Engines and Visualization.
CO3	Classify the various methods of Statistics and Data Mining.
CO4	Summarize the basics of Pattern Matching.
CO5	Understand the concepts of Modelling and Simulation.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	3	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	1	2	-	2	-	-	-	-	-	-	3	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	3	2
CO5	3	2	1	-	1	2	-	-	-	-	-	1	3	2
CO (Avg)	3	2	1	2	1	2	-	-	-	-	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTORY CONCEPTS	9
The Central Dogma - The Killer Application - Parallel Universes - Watsons definition - Top-down versus Bottom-up - Information Flow - Convergence - Databases - Data Management - Data Life Cycle - Database Technology - Interfaces - Implementation - Networks - Geographical Scope - Communication models - Transmissions Technology - Protocols - Bandwidth - Topology - Hardware - Contents - Security - Ownership - Implementation - Management.		
UNIT II	**SEARCH ENGINES AND DATA VISUALIZATION**	**9**
Search Process - Search Engine Technology - Searching and Information Theory - Computational methods - Search Engines and Knowledge Management - Data Visualization - Sequence Visualization - Structure Visualization - User Interface - Animation Versus Simulation - General Purpose Technologies.		
UNIT III	**STATISTICS AND DATA MINING**	**9**
Statistical concepts - Microarrays - Imperfect Data - Randomness -Variability - Approximation - Interface Noise -Assumptions - Sampling and Distributions - Hypothesis Testing Quantifying and Randomness - Data Analysis - Tool Selection Statistics of Alignment - Clustering and Classification - Data Mining - Methods - Selection and Sampling - Preprocessing and Cleaning - Transformation and Reduction - Data Mining Methods - Evaluation - Visualization - Designing new queries - Pattern Recognition and Discovery.		
UNIT IV	**PATTERN MATCHING**	**9**
Pairwise sequence alignment - Local versus Global Alignment - Multiple Sequence Alignment - Computational methods - Dot Matrix Analysis -Substitution Matrices - Dynamic Programming - Word methods - Bayesian Methods - Multiple Sequence Alignment - Dynamic Programming - Progressive strategies - Iterative Strategies - Tools - Nucleotide Pattern Matching - Polypeptide Pattern Matching - Utilities - Sequence Databases.		
UNIT V	**MODELING AND SIMULATION**	**9**
Drug Discovery - Components - Process - Perspectives - Numeric considerations - Algorithms - Hardware - Issues - Protein Structure - Ab-initio Methods - Heuristic Methods - Systems Biology - Tools -Collaboration and Communications - Standards - Issues - Security - Intellectual Property.		

Reference (s)

1	Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2	T.K.Attwood and D.J. Perry Smith, "Introduction to Bio Informatics, Longman Essen, 1999.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE005T	BLOCKCHAIN	3	0	0	3

Prerequisite Course (s)

18CSE008T – Cryptography and Network Security

Course Objective (s):
The purpose of learning this course is to:

1	Understand Blockchain fundamental components, and examine decentralization using Blockchain.
2	Explain how cryptocurrency works, from when a transaction is created to when it is considered part of the Blockchain.
3	Explain the components of Ethereum and Programming Languages for Ethereum.
4	Study the basics of Hyperledger and Web3.
5	Know about alternative Blockchains and Blockchain projects in different domains.

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Describe the technology components of Blockchain and different approaches for Decentralization.
CO2	Understand Bitcoin and its limitations by comparing with other alternative coins.
CO3	Discover solutions using the Ethereum model.
CO4	Make use of Web3 development framework and Hyperledger.
CO5	Summarize alternative Blockchain and Emerging Trends in Blockchain.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	-	1	1	1	-	1	2	2
CO2	3	2	1	1	1	-	-	1	-	1	-	1	2	2
CO3	3	2	1	1	1	-	-	1	-	1	-	1	2	2
CO4	3	2	1	-	1	1	-	2	-	1	-	-	2	2
CO5	3	2	1	-	1	1	-	2	1	1	-	1	2	2
CO (Avg)	3	2	1	1	1	1	-	1.40	1	1	-	1	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

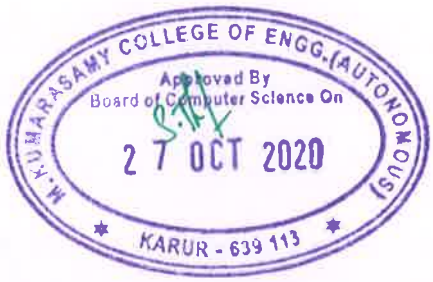
UNIT I	INTRODUCTION TO BLOCKCHAIN	9
History of Blockchain - Types of Blockchain - Consensus - Decentralization using Blockchain - Blockchain and Full Ecosystem Decentralization - Platforms for Decentralization.		
UNIT II	**INTRODUCTION TO CRYPTOCURRENCY**	**9**
Bitcoin - Digital Keys and Addresses - Transactions - Mining - Bitcoin Networks and Payments - Wallets - Alternative Coins - Theoretical Limitations - Bitcoin limitations - Name coin - Prime coin - Zcash - Smart Contracts - Ricardian Contracts.		
UNIT III	**ETHEREUM**	**9**
The Ethereum Network - Components of Ethereum Ecosystem - Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule - Supporting Protocols - Solidity Language.		
UNIT IV	**WEB3 AND HYPERLEDGER**	**9**
Introduction to Web3 - Contract Deployment - POST Requests - Development Frameworks - Hyperledger as a Protocol - The Reference Architecture - Hyperledger Fabric - Distributed Ledger - Corda.		
UNIT V	**ALTERNATIVE BLOCKCHAIN AND NEXT EMERGING TRENDS**	**9**
Kadena - Ripple - Rootstock - Quorum - Tendermint - Scalability - Privacy - Other Challenges - Blockchain Research - Notable Projects - Miscellaneous Tools.		

Text Book (s)

1	Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.

Reference (s)

1	ArshdeepBahga, Vijay Madisetti, "Blockchain Applications: A Hands On Approach", VPT, 2017
2	Andreas Antonopoulos, Satoshi Nakamoto, "Mastering Bitcoin", O'Reilly, 2014.
3	Roger Wattenhofer, "The Scienceof the Blockchain" CreateSpace Independent Publishing, 2016.
4	A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016
5	Alex Leverington, "Ethereum Programming" Packt Publishing, 2017.



Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE006T	BUILDING ENTERPRISE APPLICATIONS (Recommended by Infosys)	3	0	0	3

Prerequisite Course (s)

18CSC202J – Object Oriented Programming
18CSC205J – Database Management Systems

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basics of Enterprise Applications.
2	Know the concept of Enterprise Analysis and Business Modelling, requirements validation, planning and estimation.
3	Understand about Enterprise Application Architecture and Design elements.
4	Learn and Practice different solution layers and perform Code review, Code analysis, build process
5	Understand different testing involved with enterprise application and the process of rolling out an enterprise application.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the basics of Enterprise Applications.
CO2	Familiarize with concept of Enterprise Analysis and Business Modelling, requirements validation, planning and estimation.
CO3	Discuss about Enterprise Application Architecture and Design elements.
CO4	Develop different solution layers and perform Code review, Code analysis, build process
CO5	Understand different testing involved with enterprise application and the process of rolling out an enterprise application.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	-	1	1	1	-	1	3	2
CO2	3	2	2	2	2	-	-	1	1	1	-	1	3	2
CO3	3	2	2	2	2	-	-	1	1	1	-	1	3	2
CO4	3	2	2	2	2	-	-	1	1	1	-	1	3	2
CO5	3	2	2	2	2	-	-	1	1	1	-	1	3	2
CO (Avg)	3	2	2	2	2	-	-	1	1	1	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	6
Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications		
UNIT II	**INCEPTION OF ENTERPRISE APPLICATIONS**	**9**
Inception of enterprise applications, enterprise analysis, business modelling, requirements elicitation, use case modelling, prototyping, non functional requirements, requirements validation, planning and estimation		
UNIT III	**ARCHITECTURE AND DESIGN ELEMENTS**	**12**
Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture- design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design		
UNIT IV	**CONSTRUCTION READINESS OF ENTERPRISE APPLICATIONS**	**9**
Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage		
UNIT V	**ENTERPRISE APPLICATION TESTING**	**9**
Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.		

Text Book (s)	
1	Raising Enterprise Applications – Published by John Wiley, authored by Anubhav Pradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, VeerakumarEsakimuthu
2	Building Java Enterprise Applications – Published by O'Reilly Media, authored by Brett McLaughlin
Reference (s)	
1	Software Requirements: Styles & Techniques – published by Addison-Wesley Professional
2	Software Systems Requirements Engineering: In Practice – published by McGraw-Hill/Osborne Media
3	Managing Software Requirements: A Use Case Approach, 2/e – published by Pearson
4	Software Architecture: A Case Based Approach – published by Pearson
5	Designing Enterprise Applications with the J2EE Platform (PDF available at- http://java.sun.com/blueprints/guidelines/designing_enterprise_applications_2e/)

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE007T	COMPUTER VISION	3	0	0	3

Prerequisite Course (s)

18CSE015T - Digital Image Processing

Course Objective (s):

The purpose of learning this course is to:

1	Review image processing techniques for Computer Vision.
2	Understand shape and region analysis.
3	Understand Hough Transform and its applications to detect lines, circles, ellipses.
4	Understand three-dimensional image analysis techniques and motion analysis.
5	Study some applications of Computer Vision algorithms.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basics and fundamentals of Image Processing for Computer Vision.
CO2	Discuss Shape analysis, Boundary tracking techniques, Chain codes and Region descriptors.
CO3	Apply Hough Transform for line, circle, and ellipse detections.
CO4	Summarize 3D vision and motion related techniques.
CO5	Discuss various applications of Computer Vision.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	-	1	-	2	1	-	1	2	2
CO2	3	2	1	1	1	-	1	-	2	1	-	1	2	2
CO3	3	2	1	1	1	1	1	-	2	1	1	1	2	2
CO4	3	2	1	1	1	1	1	-	2	1	1	1	2	2
CO5	3	2	1	1	1	1	1	-	2	1	1	1	2	2
CO (Avg)	3	2	1	1	1	1	1	-	2	1	1	1	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	IMAGE PROCESSING FOUNDATIONS	9
Review of image processing techniques - Classical filtering operations - Thresholding techniques - Edge detection techniques - Corner and Interest point detection - Mathematical morphology - Texture.		
UNIT II	**SHAPES AND REGIONS**	**9**
Binary shape analysis - Connectedness - Object labelling and counting - Size filtering - Distance functions - Skeletons and Thinning - Deformable shape analysis - Boundary tracking procedures - Active contours - Shape models and Shape recognition - Centroidal profiles - Handling occlusion - Boundary length measures - Boundary descriptors - Chain codes - Fourier descriptors - Region descriptors - Moments - Image Binarization using OpenCV.		
UNIT III	**HOUGH TRANSFORM**	**9**
Line detection - Hough Transform (HT) for line detection - Foot-of-normal method - Line localization - Line fitting - RANSAC for straight line detection - HT based circular object detection - Accurate center location - Speed problem - Ellipse detection - Case study: Human Iris location - Hole detection - Generalized Hough Transform (GHT) - Spatial matched filtering - GHT for ellipse detection - Object location - GHT for feature collation.		
UNIT IV	**3D VISION AND MOTION**	**9**
Methods for 3D vision - Projection schemes - Shape from shading - Photometric stereo - Shape from texture - Shape from focus - Active range finding - Surface representations - Point-based representation - Volumetric representations - 3D object recognition - 3D reconstruction - Introduction to motion - Triangulation - Bundle adjustment - Translational alignment - Parametric motion - Spline-based motion - Optical flow - Layered motion - Structure from motion concepts using OpenCV.		
UNIT V	**APPLICATIONS**	**9**
Application: Photo album - Face detection - Face recognition - Eigen faces - Active appearance and 3D shape models of faces Application: Surveillance - Foreground-Background separation - Particle filters - Chamfer matching, tracking, and occlusion - Combining views from multiple cameras - Implementing face detection using OpenCV.		

Text Book (s):

1	D. L. Baggio et al., —Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.
2	E. R. Davies, —Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.

Reference (s)

1	Jan Erik Solem, —Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.
2	Mark Nixon and Alberto S. Aquado, —Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012
3	R. Szeliski, —Computer Vision: Algorithms and Applications‖, Springer 2011.

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Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE008T	CRYPTOGRAPHY AND NETWORK SECURITY	3	1	0	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand Cryptography Theories, Algorithms and Systems.
2	Understand necessary approaches and techniques to build protection mechanisms in order to secure Computer Networks.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the fundamentals of Network Security, Security Architecture, Threats and Vulnerabilities.
CO2	Apply the different Cryptographic operations of Symmetric Cryptographic Algorithms.
CO3	Apply the different Cryptographic operations of Public Key Cryptography.
CO4	Apply the various Authentication schemes to simulate different applications.
CO5	Understand various Security Practices and System Security Standards.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	-	-	-	-	-	1	-	-	2	2
CO2	3	2	2	-	-	-	-	2	2	1	-	1	3	2
CO3	3	2	2	-	-	-	-	2	2	1	-	1	3	2
CO4	3	2	2	-	-	-	-	-	2	1	-	1	3	2
CO5	2	1	1	-	-	-	-	2	-	1	-	1	3	2
CO (Avg)	2.60	1.60	1.60	-	-	-	-	2	2	1	-	1	2.60	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9 + 3
Model of network security - Security Attacks, Services and Mechanisms - OSI Security Architecture - Classical Encryption Techniques: Substitution Techniques, Transposition Techniques, Steganography - Foundations of Modern Cryptography: Perfect Security - Information Theory - Product Cryptosystem - Cryptanalysis.		
UNIT II	**SYMMETRIC KEY CRYPTOGRAPHY**	**9 + 3**
Symmetric Key Cryptography: Algebraic Structures - Modular Arithmetic - Euclidean algorithm-Congruence and Matrices - Groups, Rings, Fields - Finite fields - Symmetric Key Ciphers: SDES – Block cipher principles of DES - Strength of DES - Differential and Linear Cryptanalysis - Block cipher design principles - Block cipher mode of operation - Evaluation Criteria for AES - Advanced Encryption Standard - RC4 - Key distribution.		
UNIT III	**PUBLIC KEY CRYPTOGRAPHY**	**9 + 3**
Asymmetric Key Cryptography: Primes - Primality Testing – Factorization - Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem - Exponentiation and logarithm - Asymmetric Key Ciphers: RSA Cryptosystem - Key distribution - Key management - Diffie Hellman Key Exchange - ElGamal Cryptosystem - Elliptic Curve Arithmetic - Elliptic Curve Cryptography.		
UNIT IV	**MESSAGE AUTHENTICATION AND INTEGRITY**	**9 + 3**
Authentication requirement - Authentication function - MAC - Hash function - Security of hash function and MAC - SHA - Digital Signature and Authentication Protocols - DSS - Entity Authentication: Biometrics, Passwords, Challenge Response protocols - Authentication applications - Kerberos, X.509		
UNIT V	**SECURITY PRACTICE AND SYSTEM SECURITY**	**9 + 3**
Electronic Mail security - PGP, S/MIME - IP security - Web Security - System Security: Intruders - Malicious software - viruses - Firewalls.		

Text Book (s)

1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

Reference (s)

1	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd
2	Behrouz A.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3	Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE009T	CYBER FORENSICS	3	0	0	3

Prerequisite Course (s)

18CSC206J – Computer Networks

Course Objective (s):

The purpose of learning this course is to:

1	Understand the fundamentals of Computer Forensics.
2	Having an overview of techniques for Data Recovery and Evidence Collection.
3	Study various threats associated with security and Information Warfare and recognize the legal underpinnings and critical laws affecting forensics.
4	Learn about current licensing and certification requirements to build the career in Digital Forensic.
5	Study the tools and tactics associated with Cyber Forensics and apply the tools and methods to uncover hidden information in Digital Systems.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand about the basic concepts of Forensic, Forensic technology & services.
CO2	Apply the tools and methods to uncover hidden information in Digital systems.
CO3	Work with court – approved tools / Hardware tools / Nontechnical tools and to prepare the report based on law and privacy concerns.
CO4	Understand the concept of Crime, Data Acquisition and Report Writing.
CO5	Understand Computer Forensic tools and Case Studies.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	2	-	-	-	1	3	2
CO2	2	2	1	1	-	-	-	2	-	-	-	1	3	2
CO3	2	2	1	1	-	-	-	2	-	-	-	1	3	2
CO4	2	2	1	1	-	-	-	2	-	-	-	1	3	2
CO5	2	2	1	1	2	-	-	2	-	-	-	1	3	2
CO (Avg)	**2.60**	**2**	**1**	**1**	**2**	-	-	**2**	-	-	-	**1**	**2.60**	**2.20**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Computer Forensics Fundamentals - Types of Computer Forensics Technology - Types of Vendor and Computer Forensics Services.		
UNIT II	**COMPUTER FORENSICS EVIDENCE AND INVESTIGATIVE SMART PRACTICES**	**9**
Data Recovery - Evidence Collection and Data Seizure - Duplication and Preservation of Digital Evidence - Computer Image Verification and Authentication - Forensics Investigative Smart Practices - Time and Forensics - Incident closure.		
UNIT III	**COMPUTER FORENSICS ANALYSIS , LAWS AND PRIVACY CONCERNS**	**9**
Discover of Electronic Evidence - Identification of Data - Reconstructing Past Events Fighting against Macro Threats - Information Warfare Arsenal - Tactics of the Military - Tactics of Terrorist and Rogues - Tactics of Private Companies - Laws Affecting Forensics Investigations - Search Warrants and Subpoenas - Legislated Privacy Concerns - admissibility of Evidence - First Response and Digital Investigator.		
UNIT IV	**INFORMATION WARFARE ,DATA ACQUISITION AND REPORT WRITING**	**9**
Arsenal - Surveillance Tools - Hackers and Theft of Components - Contemporary Computer Crime Identity Theft and Identity Fraud - Organized Crime & Terrorism Avenues Prosecution and Government Efforts - Applying the First Amendment to Computer Related Crime - The Fourth Amendment and Other Legal Issues - Data Acquisition - Finding Lost Files - Document Analysis - Case Management and Report Writing - Building a Forensics Workstation.		
UNIT V	**COMPUTER FORENSICS , TOOLS AND CASE STUDIES**	**9**
Developing Forensics Capabilities - Searching and Seizing Computer Related Evidence - Processing Evidence and Report Preparation - Future Issues - Tools of the Digital Investigator - Licensing and Certification - Case Studies: E-mail Forensics - Web Forensics - Searching the Network - Excavating a Cloud - Mobile Device Forensics.		

Text Book (s)

1	Michael Graves, —Digital Archaeology: The Art and Science of Digital Forensics, Addison Wesley Professional, 2014.
2	Darren R. Hayes, —Practical Guide to Computer Forensics Investigation, Pearson, 2015.
3	Albert J. Marcella and Frederic Guillossou, —Cyber Forensics: From Data to Digital Evidence —, Wiley, 2015.

Reference (s)

1	Bill Nelson, Amelia Phillips and Christopher Steuart, —Guide to Computer Forensics and Investigationsl, Fourth Edition, Cengage, 2013.
2	John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation, Volume1,

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	CengageLearning, 2005.
3	Marjie T Britz , "Computer Forensics and Cyber Crime: An Introduction, 3/E, Pearson Education,2013
4	Marie-Helen Maras, "Computer Forensics: Cybercriminals, Laws, and Evidence", Jones &BartlettPublishers, 2011.
5	Chad Steel, "Windows Forensics", W iley India, 2006.Majid Yar, "Cybercrime and Society", Sag ePublications, 2006.Robert M Slade, "Software Forensics", Tata McGraw Hill, 2004.

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Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE010J	DATA SCIENCE	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Know the fundamental concept of Data Science.
2	Understand and apply Data Preprocessing Techniques.
3	Learn different Feature Selection and Dimensionality Reduction Techniques.
4	Study various Classification Algorithms for analyzing Multi-dimensional data.
5	Know the basics of Time-series analysis and applications of Data Science in various fields.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain and work with the basic concepts of Data Science.
CO2	Apply Data Preprocessing Techniques to handle missing and inconsistent data.
CO3	Utilize appropriate Feature Selection and Dimensionality Reduction Techniques.
CO4	Apply Classification Algorithms for an application and analyze the results.
CO5	Explain Time Series model and use appropriate algorithms for various applications.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	2	1	2	-	1	2	1
CO2	3	2	2	1	1	1	-	2	2	2	1	2	3	2
CO3	3	2	2	1	1	1	2	2	2	2	2	2	3	2
CO4	3	2	2	2	2	1	2	2	2	2	2	2	3	2
CO5	3	2	2	1	1	1	2	2	2	2	2	2	3	2
CO (Avg)	3	2	2	1.25	1.25	1	2	2	1.8	2	1.75	1.8	2.8	1.8

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO STATISTICS	9
Statistical Inference - Correlation - Probability - Conditional Probability - Bayes Theorem - Random Variables - Normal Distribution - Central Limit Theorem - Hypothesis and Inference - Confidence Interval - R programming language - Functions, Control flow and Loops - Reading in Data, Writing Data, Working with Data.		
UNIT II	**DATA COLLECTION AND PREPROCESSING**	**9**
Types of Data Sources - Sampling - Types of Data Elements - Visual Data Exploration and Exploratory Statistical Analysis - Handling Missing Entries - Handling Incorrect and Inconsistent Entries - Scaling and Normalization - Outlier Detection and Treatment - Standardizing Data - Categorization - Weights of Evidence Coding - Variable Selection - Segmentation.		
UNIT III	**DATA REDUCTION AND TRANSFORMATION**	**9**
Feature Selection algorithms - Filter Models - Gini Index - Entropy - Fisher Score - Fisher's Linear Discriminant - Wrapper Models - Embedded Models - Forward selection backward elimination - Curse of Dimensionality - Principal Component Analysis - Singular Value Decomposition - Latent Semantic Analysis - Applications of PCA and SVD - Haar Wavelet Transform - Multidimensional Scaling.		
UNIT IV	**CLASSIFICATION TECHNIQUES**	**9**
Introduction - Classification and Regression Trees - Linear Regression - Probabilistic Classifiers - Naive Bayes Classifier - Logistic Regression - Support Vector Machines - Neural Networks - Classifier Evaluation - Ensemble Learning - Bagging - Boosting - Multiclass Classification Technique.		
UNIT V	**TIME SERIES ANALYSIS AND APPLICATIONS**	**9**
Overview of Time Series Analysis - Box-Jenkins Methodology - ARIMA Model - Autocorrelation Function (ACF) - Autoregressive Models - Moving Average - ARMA and ARIMA Models - Building and Evaluating an ARIMA - Applications - Credit Risk Modelling - Fraud Detection - Net Lift Response Modelling - Churn Prediction.		
	LIST OF EXPERIMENTS	**15**

1. Implement Correlation Analysis
2. Implement Data Preprocessing
3. Implement Feature Selection Algorithm
4. Implement Linear/Logistic regression
5. Implement Decision trees / Naïve Bayes
6. Implement Support Vector Machine (SVM)
7. Implement Artificial Neural Network (ANN)
8. Implement Confusion Matrix using any modelling
9. Implement Time Series Analysis using ARIMA models
10. Implement Data Visualization

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Text Book (s)	
1	Bart Baesens, "Analytics in a Big Data World, The Essential Guide to Data Science and Its Applications", Wiley, 2014.
2	Charu C. Aggarwal ,"Data Mining The Text book", Springer, 2015.
Reference (s)	
1	Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC press, 2015.
2	Data Science & Big Data Analytics, Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services, Wiley, 2015.
3	Karthik Ramasubramanian and Abhishek Singh, "Machine Learning Using R With Time Series and Industry-Based Use Cases in R"—Second Edition, Apress, 2019.
4	Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
5	Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE011T	DATA WAREHOUSING AND DATA MINING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Outline the concepts of Data Warehousing and OLAP.
2	Highlight the different techniques involved in Data Mining.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Design the Data warehouse Schema and OLAP operations for a given problems.
CO2	Explain the functions involved in the Data Mining process.
CO3	Apply the Association Rule Mining techniques and Classification algorithms to solve the real world problems.
CO4	Apply the various Clustering algorithms for partitioning the given data.
CO5	Use the WEKA tool in Data Mining applications.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	-	-	-	-	2	1	-	1	3	3
CO2	3	2	-	-	-	-	-	-	-	1	-	-	3	2
CO3	3	3	3	3	2	3	-	3	2	1	-	1	3	3
CO4	3	3	2	2	2	-	-	2	2	1	-	1	3	3
CO5	3	3	2	3	2	2	-	3	2	1	-	1	3	3
CO (Avg)	3	2.80	2.50	2.50	2.00	2.50	-	2.66	2	1	-	1	3	2.80

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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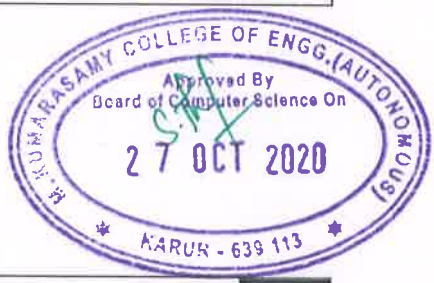
UNIT I	DATA WAREHOUSING & ONLINE ANALYTICAL PROCESSING	9
Basic Concepts - Data Warehousing Components - Data Warehouse Models - Metadata - Data Cube: A Multi-dimensional Data Model - Schemas for Multidimensional Data Models - Semantic Layer: Introduction - Building the Data warehouse Semantic Layer - Dimensions - Measures - OLAP: Types of OLAP - ROLAP, MOLAP, HOLAP.		
UNIT II	**DATA MINING**	**9**
Data Mining Functionalities - Data Preprocessing: An Overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation.		
UNIT III	**ASSOCIATION RULE MINING & CLASSIFICATION**	**9**
Association Rule Mining: Basic Concepts – Frequent Itemsets Mining Methods- Finding Frequent Itemsets by Confined Candidate Generation – Finding Frequent Itemsets without Candidate Generation - Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification.		
UNIT IV	**CLUSTERING**	**9**
Basic Concepts- Requirements for Cluster Analysis - Overview of Basic Clustering Methods - Partitioning Methods - Hierarchical Based Clustering - Density Based Methods.		
UNIT V	**TOOLS & APPLICATIONS OF DATA MINING**	**9**
WEKA: Introduction - Data Preprocessing - Classification - Clustering - Association Rules - Attribute Selection - Data Visualization - Applications: Text Mining - World Wide Web Mining - Multimedia Mining.		

Text Book (s)

1	Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, Reprinted 2012.

Reference (s)

1	Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, 27th Reprint 2013.
2	Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining", Pearson Education, 2016.
3	Ian Witten, Eibe Frank, Mark Hall, Christopher Pal, "Data Mining: Practical Machine Learning Tools and Techniques", Elseiver, 4th Edition, 2016.



Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE012T	DATABASE SECURITY AND PRIVACY	3	0	0	3

Prerequisite Course (s)

18CSE205J - Database Management Systems

Course Objective (s):

The purpose of learning this course is to:

1	Understand the fundamentals of security, and how it relates to information systems.
2	Identify risks and vulnerabilities in operating systems from a database perspective.
3	Learn good password policies, and techniques to secure passwords in an organization.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the concepts of security for database application development.
CO2	Explain the authentication process in the database.
CO3	Illustrate the database application security models and virtual private databases.
CO4	Illustrate the security audit methods.
CO5	Explain the privacy preserving and data mining techniques.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	-	-	-	-	-	2	-	-	-	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	-	-	-	-	-	-	2	-	-	-	3	2
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	2
CO (Avg)	3	2.6	2	-	-	-	-	-	2	-	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	CONCEPTS OF SECURITY	9
Introduction includes threats - Vulnerabilities and Breaches - Basics of database design - DB security - Concepts - Approaches and Challenges- Types of access controls - Oracle VPD - Discretionary and Mandatory access control Principles - Applications and poly - Instantiation - Database inference problem - Types of inference attacks - Distributed database - Security levels - SQL-injection.		
UNIT II	**ADMINISTRATION OF USERS & PROFILES,PASSWORD POLICIES, PRIVILEGES AND ROLES**	**9**
Administration of Users: Introduction - Authentication - Creating Users, SQL Server User - Removing, Modifying Users - Default, Remote Users - Database Links - Linked Servers - Remote Servers - Practices for Administrators and Managers - Best Practices Profiles, Password Policies. Privileges and Roles: Introduction - Defining and Using Profiles - Designing and Implementing Password Policies - Granting and Revoking User Privileges - Creating, Assigning and Revoking User Roles - Best Practices - OWASP.		
UNIT III	**DATABASE APPLICATION SECURITY MODELS & VIRTUAL PRIVATE DATABASES**	**9**
Database Application Security Models: Introduction - Types of Users - Security Models - Application Types - Application Security Models - Data Encryption. Virtual Private Databases: Introduction - Overview of VPD - Implementation of VPD using Views, Application Context in Oracle - Implementing Oracle VPD - Viewing VPD Policies and Application contexts using Data Dictionary - Policy Manager - Implementing Row and Column level Security with SQL Server.		
UNIT IV	**DATA BASE AUDITING**	**9**
Auditing Database Activities: Using Oracle Database Activities - Creating DLL Triggers with Oracle - Auditing Database Activities with Oracle - Auditing Server Activity with SQL Server 2000 - Security and Auditing Project Case Study.		
UNIT V	**PRIVACY PRESERVING DATA MINING TECHNIQUES**	**9**
Introduction - Privacy Preserving Data Mining Algorithms - General Survey - Randomization Methods - Group Based Anonymization - Distributed Privacy Preserving Data Mining - Application of Privacy Preserving Data Mining.		

Text Book (s)

1	Hassan A. Afyouni, "Database Security and Auditing", Third Edition, Cengage Learning, 2009
2	Charu C. Aggarwal, Philip S Yu, "Privacy Preserving Data Mining": Models and Algorithms, Kluwer Academic Publishers, 2008

Reference (s)

1	Ron Ben Natan, "Implementing Database Security and Auditing", Elsevier, Indian reprint 2006.
2	BhavaniThuraisingham, "Database and Applications Security", Integrating Information Security and Data Management, Auerbach Publications, 2005.
3	Alfred Basta, Melissa Zgola, "Database Security", Course Technology, 2012.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE013T	DEEP LEARNING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Explain the basic concepts of Neural Networks and Deep Neural Networks.
2	Discuss the major architectures of Deep Neural Networks.
3	Examine the core concepts in Deep architecture tuning.
4	Demonstrate the applications of Deep Learning.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Discuss the foundation of Neural Networks.
CO2	Describe the fundamentals of Deep Networks.
CO3	Select the appropriate Deep Network Architecture.
CO4	Analyze the performance of a deep learning network.
CO5	Apply deep learning for solving real world problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	-	-	1	1	1	-	1	3	2
CO2	3	2	1	-	1	-	-	1	1	1	-	1	3	2
CO3	3	2	2	-	1	-	-	1	1	1	-	1	3	2
CO4	3	3	3	2	1	-	-	1	1	1	-	1	3	2
CO5	3	3	3	2	1	-	-	1	1	1	-	1	3	2
CO (Avg)	3	2.4	2	2	1	-	-	1	1	1	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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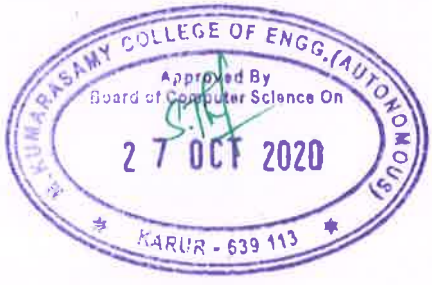
UNIT I	FOUNDATIONS OF NEURAL NETWORKS	9
Neural Networks - Training Neural Networks - Activation Functions - Loss Functions - Hyperparameters.		
UNIT II	**FUNDAMENTALS OF DEEP NETWORKS**	**9**
Defining Deep Learning - Common Architectural Principles of Deep Networks - Building Blocks of Deep Networks.		
UNIT III	**MAJOR ARCHITECTURES OF DEEP NETWORKS**	**9**
Unsupervised Pre-Trained Networks - Convolutional Neural Networks - Recurrent Neural Networks - Recursive Neural Networks.		
UNIT IV	**TUNING DEEP NETWORKS**	**9**
Basic Concepts in Tuning Deep Networks - Matching Input Data and Network Architectures - Relating Model Goal and Output Layers - Working with Layer Count, Parameter Count and Memory - Weight Initialization Strategies - Using Activation Functions.		
UNIT V	**APPLICATIONS**	**9**
Large-Scale deep learning Computer Vision - Speech Recognition - Natural Language Processing- Recommender systems - Case Study- Applications of Deep Learning in Health Care.		

Text Book (s)

1	Adam Gibson, Josh Patterson, Deep Learning,O'Reilly Media, 2017.
2	Ian Goodfellow, YoshuaBengio and Aaron Courville, Deep Learning, MIT Press, 2016.

Reference (s)

1	Daniel Graupe, Deep Learning Neural Networks: Design and Case Studies, World Scientific Publishing, 2016.
2	Yu and Li Deng, Deep Learning: Methods and Applications, Now Publishers Inc, 2014.
3	Zurada, J.M. "Introduction to Artificial Neural Systems", Jaico Publishing Hours, 2012.



Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE014J	DEVELOPING WEB APPLICATIONS IN .NET (Recommended by Infosys)	3	0	2	4

Prerequisite Course (s)

18CSC202J - Object oriented Programming
18CSC205J - Database Management Systems
18CSC303J - Web Programming

Course Objective (s):

The purpose of learning this course is to:

1	Understand the .Net framework concepts, Object Oriented concepts using CSharp, SQL Server.
2	Understand the data access programming using ADO.Net and develop the web applications using ASP.Net.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basics concepts of .Net Framework.
CO2	Discuss the object oriented concepts in C#.
CO3	Summarize the functions of SQL Server Queries.
CO4	Make use of ADO.NET data access concepts to develop applications.
CO5	Develop and deploy a web application.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	1	-	-	-	1	1	-	1	3	3
CO2	3	2	2	-	1	-	-	-	1	1	-	1	3	3
CO3	3	2	2	-	1	-	-	-	1	1	-	1	3	3
CO4	3	3	3	1	1	-	-	-	1	1	-	1	3	3
CO5	3	3	3	1	-	-	-	-	1	1	-	1	3	3
CO (Avg)	3	2.20	2.20	1	1	-	-	-	1	1	-	1	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Introduction to .NET framework: Knowledge of .NET framework -.NET features and .NET development platform - Understanding the advantages of .NET framework.		
UNIT II	**OBJECT ORIENTED CONCEPTS IN C#**	**9**
Objected Oriented concepts using CSharp Language - Object Oriented Programming (review only) - Advanced concept in OOP - Relationship - Inheritance - Abstract Classes - Polymorphism - Object Oriented design methodology - Approach - Best practices - UML Class diagrams - Interface - Common Base Class.		
UNIT III	**SQL SERVER 2008**	**9**
Design and develop Database using SQL Server 2008 - features and architecture of MS - SQL Server 2008: Introduction to Database Engine and storage Engine - Create Tables, temporary tables, and Integrity rules - Ability to code in Batches - Write Stored Procedures/Functions - Ability to handle errors - Transaction in SQL server.		
UNIT IV	**DATA ACCESS USING ADO.NET**	**9**
Data Access programming using ADO.NET – Challenges with respect to data access, associated in building internet applications - Common data access programming model - ADO.NET components for application development - Configuring and Executing various objects - Understanding connected and disconnected models for data access.		
UNIT V	**DEVELOPING WEB APPLICATIONS USING ASP.NET**	**9**
Web Application Development using ASP.NET - Basics of HTML, JavaScript, CSS - Basics of ASP.NET - Page Object and Dynamic Compilation Model - ASP.NET controls - Data Binding and various Data Sources in ASP.NET- Creation of Master Pages and themes - Configuration of web applications - IIS configurations - State management in ASP.NET.		
LIST OF EXPERIMENTS		**15**

1. Basic Programs using C#
2. Programs on Object Oriented concepts using C#
   a. Inheritance
   b. Polymorphism,
   c. Abstract Classes
   d. Delegates
   e. Exception Handling
3. Programs on Array using C#
4. Programs on SQL Server
5. Develop Windows Applications using ADO.NET
6. Develop Web Applications using ASP.NET

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Text Book (s)	
1	C# and the .Net Platform by Troelsen, Andrew, Apress .
2	Microsoft Visual C# 2005 Step by Step by Sharp, John,, Microsoft, 2005.
Reference (s)	
1	Inside C#, by Archer, Tom , Wrox Publication.
2	Murach's SQLSERVER 2008 for developers by bryanSyverson.
3	Mastering Microsoft SQL SERVER 2008 by Michael Lee , Gentry Bieker.
4	Rebecca M. Riordan, Microsoft® ADO.NET 2.0 Step by Step, Microsoft Press, 2005.
5	Professional ASP.NET 3.5, Anderson, Francis, Howrad, Sussman, Watson (Wrox Publications).
6	Beginning ASP.NET 3.5 ,Ullman, Sussman, Kauffman, Hart, Maharry (Wrox Publications).

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE015T	DIGITAL IMAGE PROCESSING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basic concepts of Digital Image Processing and various image transforms.
2	Familiarize the student with the Image Enhancement Techniques.
3	Expose the student to a broad range of Image Processing techniques and their applications.
4	Know the use of current technologies that are specific to Image Processing Systems.
5	Expose the students to real-world applications of Image Processing.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basics and fundamentals of Image Processing.
CO2	Illustrate Image Enhancement Techniques.
CO3	Demonstrate the Restoration concepts and Filtering Techniques.
CO4	Illustrate Feature Extraction methods and Image Segmentation Algorithms.
CO5	Discuss about Image Compression Techniques and Applications.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	-	1	-	2	-	-	-	2	2
CO2	3	2	1	1	1	-	1	-	2	1	1	1	2	2
CO3	3	2	1	1	1	1	1	-	2	1	1	1	2	2
CO4	3	2	1	1	1	1	1	-	2	1	1	1	2	2
CO5	3	2	1	1	1	1	1	-	2	1	1	1	2	2
CO (Avg)	3	2	1	1	1	1	1	-	2	1	1	1	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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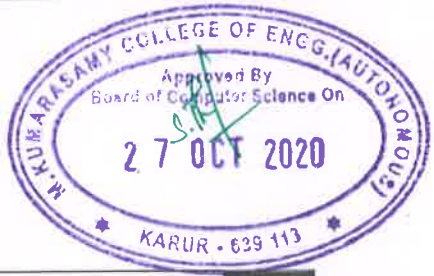
UNIT I	FOUNDATION OF IMAGE PROCESSING	9
Introduction - Applications of Image Processing - Steps in Image Processing Applications - Digital Imaging System - Sampling and Quantization - Pixel Connectivity - Distance Measures - Colour Fundamentals and Models - File Formats - Image Operations.		
UNIT II	**IMAGE ENHANCEMENT**	**9**
Image Transforms: Discrete Fourier Transform - Fast Fourier Transform - Discrete Cosine Transform - Image Enhancement in Spatial and Frequency Domain - Grey Level Transformations - Histogram Processing - Spatial Filtering - Smoothing and Sharpening - Frequency Domain: Filtering in Frequency Domain.		
UNIT III	**IMAGE RESTORATION AND MULTI-RESOLUTION ANALYSIS**	**9**
Multi Resolution Analysis: Image Pyramids - Multi Resolution Expansion - Wavelet Transforms - Image Restoration - Image Degradation Model - Noise Modelling - Blur - Order Statistic Filters - Image Restoration Algorithms.		
UNIT IV	**IMAGE SEGMENTATION AND FEATURE EXTRACTION**	**9**
Image Segmentation - Detection of Discontinuities - Edge Operators - Edge Linking and Boundary Detection - Thresholding - Region based Segmentation - Image Features and Extraction - Image Features - Types of Features - Feature extraction - SIFT SURF and Texture - Feature Reduction Algorithms.		
UNIT V	**IMAGE COMPRESSION TECHNIQUES AND APPLICATIONS**	**9**
Need for data compression – Huffman coding - Run Length Encoding - Shift codes - Arithmetic coding - JPEG standard - MPEG - Boundary representation - Boundary description - Fourier Descriptor - Regional Descriptors - Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.		

Text Book (s)

1	Rafael Gonzalez, Richard E. Woods, "Digital Image Processing", Fourth Edition, Pearson Education, 2018.
2	S. Sridhar, "Digital Image Processing", Second Edition, Oxford University Press, 2016.

Reference (s)

1	Anil K. Jain, "Fundamentals of Digital Image Processing", PHI, 2011.
2	Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", Fourth Edition, Cengage India, 2017.



Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE016T	DISTRIBUTED COMPUTING SYSTEMS	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Layout foundations of Distributed Systems.
2	Introduce the idea of Middleware and related issues.
3	Understand in detail the system level and support required for Distributed System.
4	Understand the issues involved in studying data and design of Distributed Algorithms.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Distinguish Distributed Computing Paradigm from other Computing Paradigms.
CO2	Illustrate the mechanisms of Inter Process Communication in Distributed System.
CO3	Identify the core concepts of Distributed Systems.
CO4	Apply appropriate Distributed System Principles in ensuring Transparency, Consistency and Fault-tolerance in Distributed File System
CO5	Compare the Concurrency Control Mechanisms in Distributed Transactional Environment.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	2	-	2	3	2
CO2	3	2	2	-	-	-		-	-	-	-	1	3	2
CO3	2	2	2	-	2	-	-	-	-	2	-	1	3	2
CO4	3	2	2	-	-	-	-	-	-	-	-	1	3	2
CO5	2	2	2	-	-	-	-	-	-	-	-	1	3	2
CO (Avg)	2.60	2	2	-	2	-	-	-	-	2	-	1.20	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Introduction - Examples of Distributed Systems - Trends in Distributed Systems - Focus on Resource Sharing - Challenges - Case study: World Wide Web.		
UNIT II	**COMMUNICATION IN DISTRIBUTED SYSTEM**	**9**
System Model - Inter-process Communication - API for Internet Protocols - External data representation and Multicast Communication - Network Virtualization: Overlay Networks - Case study: MPI		
UNIT III	**REMOTE METHOD INVOCATION AND OBJECTS**	**9**
Remote Invocation - Introduction - Request-Reply Protocols - Remote Procedure Call - Remote Method Invocation - Case study: Java RMI - Group Communication - Publish-Subscribe Systems - Message Queues - Shared Memory Approaches - Distributed Objects - Case study: CORBA - from objects to components		
UNIT IV	**PEER TO PEER SERVICES AND FILESYSTEM**	**9**
Peer-to-Peer Systems – Introduction - Napster and its Legacy - Peer-to-peer – Middleware - Routing Overlays - Overlay Case Studies: Pastry, Tapestry- Distributed File Systems –Introduction - File Service Architecture - Andrew File System.		
UNIT V	**SYNCHRONIZATION AND REPLICATION**	**9**
Introduction - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time and Logical Clocks - Global States - Coordination and Agreement - Introduction - Distributed Mutual Exclusion - Elections - Transactions and Concurrency Control - Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Distributed Deadlocks - Replication - Case study – Coda		

Text Book (s)

1	George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design" Fifth edition – 2011- Addison Wesley.
2	Pradeep K Sinha, Distributed Operating Systems : Concepts and Design, Prentice Hall of India

Reference (s)

1	Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms" , Pearson Education ,2007.
2	Liu M.L., "Distributed Computing, Principles and Applications", Pearson and education, 2004.
3	A S Tanenbaum and M V Steen, Distributed Systems: Principles and paradigms, Pearson Education, 2007.
4	M Solomon and J Krammer, Distributed Systems and Computer Networks, PHI.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE017T	EMBEDDED COMPUTING SYSTEMS	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the architecture and programming of ARM Processor.
2	Be exposed to the basic concepts of real time operating systems.
3	Compare Programming in Assembly Language and High Level Language.
4	Familiarize with the Embedded Computing Platform design and analysis.
5	Understand Embedded System Design methodologies for a real-life application.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the Architecture and Programming of ARM processor and Microcontroller.
CO2	Explain the basic concepts of Real Time Operating System design.
CO3	Compare programming in Assembly Language and in High Level Language like C.
CO4	Illustrate simple Embedded Computing platform such as bus, memory, I/O devices and software tools.
CO5	Describe Embedded System design methodologies and Fault Tolerance Techniques.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	1	1	1	3	2
CO2	3	2	1	1	-	-	-	-	-	1	1	1	2	2
CO3	3	3	3	3	-	-	2	-	2	1	1	1	3	2
CO4	3	2	1	1	1	-	2	-	2	1	1	1	3	2
CO5	3	3	1	1	1	-	-	-	-	1	1	1	2	2
CO (Avg)	3	2.40	1.40	1.40	1	-	2	-	2	1	1	1	2.60	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO EMBEDDED SYSTEMS AND ARM PROCESSOR	9
Introduction - Complex Systems and Microprocessors - System Design Process - ARM Processor - Architecture - Instruction Set - Programming: Programming Input and Output - Supervisor Mode - Exceptions and Traps.		
UNIT II	**PROCESSES AND OPERATING SYSTEMS**	**9**
Introduction - Multiple Tasks and Multiple Processes - Preemptive Real-Time Operating Systems - Priority Based Scheduling - Inter-Process Communication Mechanisms - Evaluating Operating System Performance - Power Management and Optimization for Processes - Design Example.		
UNIT III	**EMBEDDED C PROGRAMMING**	**9**
Programming Embedded Systems in C - Programming using Microcontroller/OS II Functions - Inline Functions and Inline Assembly - Portability Issues - Meeting Real Time Constraints - Multistate Systems and Function Sequences.		
UNIT IV	**EMBEDDED COMPUTING PLATFORM DESIGN**	**9**
CPU Bus - Memory Devices - I/O Devices - Embedded Software Development Tools - Emulators and Debuggers - Challenges of Embedded Systems - Embedded System Design Process - Design Issues - Introduction to Multiprocessors in Embedded Systems - Networks for Embedded Systems.		
UNIT V	**EMBEDDED SYSTEM DEVELOPMENT**	**9**
Design Methodologies - UML as Design Tool - UML Notation - Architectural Design - Hardware - Software Partitioning & Integration - Design Examples - Elevator Control System - ATM System -Fault-Tolerance Techniques - Reliability Evaluation Techniques.		

Text Book (s)

1	Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
2	Andrew N Sloss, D. Symes, C. Wright, —ARM System Developer's Guidel, First Edition, Morgan Kaufmann/Elsevier, 2006.

Reference (s)

1	Steve Heath, —Embedded Systems Designl, Second Edition, Elsevier, 2008.
2	Raj Kamal, —Embedded Systems- Architecture, Programming and Designl, Tata McGraw Hill, 2nd edition, 2009.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE018T	FREE OPEN SOURCE SOFTWARE	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basics of open source software.
2	Gain the knowledge of working with Linux platform and database.
3	Familiar with different programming concepts in Linux.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Analyze the components of Linux operating system with the basic commands that are used to perform operations with the terminal in Linux.
CO2	Apply the steps to install Linux in a system and explore the software to be used with the Linux system.
CO3	Implement networking in Linux for user account management and user account protection.
CO4	Demonstrate how to compile C and C++ programs in Linux using GNU Debugger on consideration with make files.
CO5	Develop programs using ruby, python and GTK for working with Linux and explore the architecture of X Windows in Linux.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	1	-	-	-	-	-	2	1
CO2	3	2	1	-	-	-	1	-	-	-	-	-	2	1
CO3	3	2	1	-	-	-	1	-	-	-	-	-	2	1
CO4	3	2	1	-	-	-	1	-	-	-	-	-	2	1
CO5	3	2	1	-	-	-	1	-	-	-	-	-	2	1
CO (Avg)	**3**	**2**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**1**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Introduction to Linux Operating System - Basic UNIX Commands - File Filters: File Related Commands - Piping - Joining, awk and backup Commands - Processes in Linux: User Process and Terminal Handling.		
UNIT II	**CONFIGURING LINUX SERVICES**	**9**
Debian Linux Installation - Installing Apache: The Web Server - Samba Installation and Configuration: File Sharing - Compiling from Sources - Installing - NFS - Installing SMTP Mail Server - Installing Common Unix printing System.		
UNIT III	**NETWORKS IN LINUX**	**9**
Installing Squid Proxy and Firewalls - Users and Account Management: Configuration - Creating - Testing - Removing - Allocating - System Logging: Logging - Accounting - Graphical Tools.		
UNIT IV	**COMPILING AND DEBUGGING**	**9**
Compiling C and C++ Programs under Linux - GNU Debugger: Debugger using GDB - Make: Syntax of makefiles - Automake and Autoconf.		
UNIT V	**PROGRAMMING IN LINUX**	**9**
Introduction to Python - Ruby - OOPS through Ruby - Calling UNIX System Calls from Ruby - X Windows Architecture and GUI Programming: GTK Programming.		

Text Book (s)

1	N. B. Venkateshwarlu, Introduction to Linux: Installation and Programming, B S Publishers; 2014. (An NRCFOSS Publication).

Reference (s)

1	Steve Suchring, MySQL Bible, John Wiley, 2015.
2	Wesley J. Chun, Core Python Programming, Prentice Hall, 2010.
3	Martin C. Brown, Perl: The Complete Reference, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
4	Steven Holzner, PHP: The Complete Reference, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE019T	GREEN COMPUTING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):
The purpose of learning this course is to:

1	Learn the fundamentals of Green Computing.
2	Analyze the Green Computing Grid Framework.
3	Understand the issues related with Green Compliance.
4	Study and Develop various case studies.

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Discuss about Green Computing practices to minimize negative impacts on the environment.
CO2	Apply the skill in energy saving practices in their use of hardware.
CO3	Discuss Green Computing Framework techniques.
CO4	Use the technology tools that can reduce paper waste and carbon footprint by the stakeholders.
CO5	Understand the ways to minimize equipment disposal requirements.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	1	3	2
CO2	3	2	1	-	-	-	-	-	-	-	-	1	3	2
CO3	2	2	1	-	-	-	-	-	-	-	-	1	3	2
CO4	3	2	1	-	-	-	-	-	-	-	-	1	3	2
CO5	2	2	1	-	-	-	-	-	-	-	-	1	3	2
CO (Avg)	2.60	2	1	-	-	-	-	-	-	-	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FUNDAMENTALS	9
Green IT Fundamentals: Business, IT, and the Environment - Green computing: carbon foot print, scoop on power - Green IT Strategies: Drivers, Dimensions, and Goals - Environmentally Responsible Business: Policies, Practices, and Metrics.		
UNIT II	**GREEN ASSETS AND MODELLING**	**9**
Green Assets: Buildings, Data Centres, Networks, and Devices - Green Business Process Management: Modelling, Optimization, and Collaboration - Green Enterprise Architecture - Environmental Intelligence - Green Supply Chains - Green Information Systems: Design and Development Models.		
UNIT III	**GRID FRAMEWORK**	**9**
Virtualization of IT systems - Role of electric utilities, Telecommuting, Teleconferencing and Teleporting - Materials recycling - Best ways for Green PC - Green Data centre - Green Grid framework.		
UNIT IV	**GREEN COMPLIANCE**	**9**
Socio-cultural aspects of Green IT - Green Enterprise Transformation Roadmap - Green Compliance: Protocols, Standards, and Audits - Emergent Carbon Issues: Technologies and Future.		
UNIT V	**CASE STUDIES**	**9**
The Environmentally Responsible Business Strategies (ERBS) - Case Study Scenarios for Trial Runs - Case Studies - Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.		

Text Book (s)

1	BhuvanUnhelkar, —Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2014.
2	Woody Leonhard, Katherine Murray, —Green Home computing for dummies, August 2012.

Reference (s)

1	Alin Gales, Michael Schaefer, MikeEbbers, —Green Data Center: steps for the Journey, Shroff/IBM rebook, 2011.
2	John Lamb, —The Greening of IT, Pearson Education, 2009.
3	Jason Harris, —Green Computing and Green IT- Best Practices on regulations & industry, Lulu.com, 2008
4	Carl speshocky, —Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
5	Wu Chun Feng (editor), —Green computing: Large Scale energy efficiency, CRC Press

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE020T	INFORMATION RETRIEVAL TECHNIQUES	3	0	0	3

Prerequisite Course (s)

18CSC205J - Database Management Systems

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basics of Information Retrieval.
2	Understand different IR models and its applications.
3	Apply Machine Learning techniques for Text Classification and Clustering.
4	Understand various Search Engine architectures and its ranking.
5	Know different techniques of Recommender System.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Use an Open Source Search Engine Framework and explore its capabilities.
CO2	Describe models like Boolean Model, Probabilistic Model and Neural Network Model to identify the similarity of query and document.
CO3	Apply appropriate method of Classification or Clustering techniques.
CO4	Illustrate various Search Engine architectures and its ranking.
CO5	Explain how matrix Factorization Models and Neighborhood Models applied to Recommender system.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	2	-	1	3	2
CO2	3	3	2	2	-	-	-	-	-	2	-	1	3	2
CO3	3	3	3	2	-	-	-	-	-	2	-	1	3	2
CO4	3	3	2	2	-	-	-	-	-	2	-	1	3	2
CO5	3	3	2	2	-	-	-	-	-	2	-	1	3	2
CO (Avg)	3	3	2.20	2	-	-	-	-	-	2	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Information Retrieval - Early Developments - IR Problem - Users Task - Information versus Data Retrieval - IR System - Software Architecture of the IR System - Retrieval and Ranking Processes - Web - e-Publishing Era - How the web changed Search - Practical Issues on the Web - How People Search - Search Interfaces Today - Visualization in Search Interfaces.		
UNIT II	**MODELING AND RETRIEVAL EVALUATION**	**9**
Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model - Probabilistic Model - Latent Semantic Indexing Model - Neural Network Model - Retrieval Evaluation - Retrieval Metrics - Precision and Recall - Reference Collection - User-based Evaluation - Relevance Feedback and Query Expansion - Explicit Relevance Feedback.		
UNIT III	**TEXT CLASSIFICATION AND CLUSTERING**	**9**
Characterization of Text Classification - Unsupervised Algorithms: Clustering - Naïve Text Classification - Supervised Algorithms - Decision Tree, k-NN Classifier, SVM Classifier - Feature Selection or Dimensionality Reduction - Evaluation metrics - Accuracy and Error - Organizing the Classes - Indexing and Searching - Inverted Indexes - Sequential Searching - Multi-dimensional Indexing.		
UNIT IV	**WEB RETRIEVAL AND WEB CRAWLING**	**9**
The Web - Search Engine Architectures - Cluster based Architecture - Distributed Architectures - Search Engine Ranking - Link based Ranking - Simple Ranking Functions - Learning to Rank - Evaluations - Search Engine Ranking - Search Engine User Interaction - Browsing - Applications of a Web Crawler - Taxonomy - Architecture and Implementation - Scheduling Algorithms – Evaluation.		
UNIT V	**RECOMMENDER SYSTEM**	**9**
Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture –Advantages and Drawbacks of Content-based Filtering – Collaborative Filtering – Matrix factorization models – Neighborhood models.		

Text Book (s)

1	Ricardo Baeza-Yates and Berthier Ribeiro-Neto, —Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books,2011.
2	Ricci, F, Rokach, L. Shapira, B.Kantor, —Recommender Systems Handbook, First Edition, 2011.

Reference (s)

1	C. Manning,P. Raghavan, and H. Schütze, —Introduction to Information Retrieval,Cambridge University Press, 2008.
2	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
3	Christopher D Manning, PrabhakarRaghavan, HinrichSchutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE021T	INFORMATION SECURITY	3	0	0	3

Prerequisite Course (s)

18CSE008T - Cryptography and Network Security

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basics of Information Security.
2	Know the legal, ethical and professional issues in Information Security.
3	Know the aspects of Risk Management.
4	Be aware of various standards in this area.
5	Know the technological aspects of Information Security.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss the basics of Information Security.
CO2	Illustrate the legal, ethical and professional issues in Information Security.
CO3	Demonstrate the aspects of Risk Management.
CO4	Summarize various standards in the Information Security System.
CO5	Design and Implementation of Security Techniques.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	-	-	-	-	1	1	-	1	2	2
CO2	2	1	1	-	-	-	-	1	-	1	-	1	2	2
CO3	2	1	1	-	-	-	-	-	1	1	-	1	2	2
CO4	2	1	1	-	-	-	-	-	-	-	-	1	2	2
CO5	2	1	1	-	-	-	-	-	-	-	-	1	2	2
CO (Avg)	2	1	1	-	-	-	-	1	1	1	-	1	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
History - Information Security Definition - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access – SDLC - Security SDLC.		
UNIT II	**SECURITY INVESTIGATION**	**9**
Need for Security - Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.		
UNIT III	**SECURITY ANALYSIS**	**9**
Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms - Information Flow and Confinement Problem.		
UNIT IV	**LOGICAL DESIGN**	**9**
Blueprint for Security - Information Security Policy - Standards and Practices - ISO 17799/BS 7799, NIST Models, VISA International Security Model - Design of Security Architecture - Planning for Continuity.		
UNIT V	**PHYSICAL DESIGN**	**9**
Security Technology - IDS, Scanning and Analysis Tools – Cryptography - Access Control Devices - Physical Security - Security and Personnel.		

Text Book (s)

1	Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 2003.

Reference (s)

1	Micki Krause, Harold F. Tipton, — Handbook of Information Security Management, Vol 1-3 CRCPress LLC, 2004.
2	Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed||, Tata McGrawHill, 2003.
3	Matt Bishop, — Computer Security Art and Science||, Pearson/PHI, 2002.

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Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE022J	INSIGHT INTO CLOUD COMPUTING (Recommended by Infosys)	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the overview of Cloud Computing.
2	Learn about Virtualization.
3	Learn Building blocks of Private Cloud and its deployment models.
4	Learn about the various Players of Public Cloud and their offerings.
5	Learn the Security concerns of Cloud Computing and various vendors of a secure Cloud model.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss the overview of Cloud Computing.
CO2	Explain about Virtualization.
CO3	Describe the Building blocks of Private Cloud and its deployment models.
CO4	Explain about the various Players of Public Cloud and their offerings.
CO5	Describe Security concerns of Cloud Computing and various vendors of a secure Cloud model.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	1	-	-	-	1	1	-	1	3	2
CO2	2	1	1	-	1	-	-	-	1	1	-	1	3	2
CO3	2	2	1	-	1	-	-	-	1	1	-	1	3	2
CO4	3	2	1	-	1	-	-	-	1	1	-	1	3	2
CO5	3	2	1	-	1	-	-	-	1	1	-	1	3	2
CO (Avg)	2	1.6	1	-	1	-	-	-	1	1	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	OVERVIEW OF CLOUD COMPUTING	10

Brief history and evolution - History of Cloud Computing - Evolution of Cloud Computing - Traditional vs. Cloud Computing - Why Cloud Computing - Cloud service models (IaaS, PaaS & SaaS) - Cloud deployment models (Public, Private, Hybrid and Community Cloud) - Benefits and Challenges of Cloud Computing - Introduction to AWS Public Cloud Vendor.

UNIT II	VIRTUALIZATION	8

Basics of virtualization - Server virtualization - VM migration techniques - Role of virtualization in Cloud Computing.

UNIT III	WORKING WITH PRIVATE CLOUD	8

Private Cloud Definition - Characteristics of Private Cloud - Private Cloud deployment models - Private Cloud Vendors – Cloud Stack - Eucalyptus and Microsoft - Private Cloud - Benefits and Challenges - Private Cloud implementation in Amazon EC2 service.

UNIT IV	WORKING WITH PUBLIC CLOUDS	11

Public Cloud Introduction - need for Public Cloud – Appropriate time span to opt for Public Cloud - Public Cloud Service Models - Public Cloud Vendors and offerings(IaaS, PaaS, SaaS) - Demonstrating public cloud with AWS - Introduction to EC2 and Storage services of AWS - Private vs. Public Cloud.

UNIT V	OVERVIEW OF CLOUD SECURITY	8

Security concerns in Traditional IT - Introduce challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security - Security reference model - Abuse and Nefarious Use of Cloud Computing - Insecure Interfaces and APIs - Malicious Insiders - Shared Technology Issues - Data Loss or Leakage - Account or Service Hijacking - Unknown Risk Profile - Shared Security model between vendor and customer in IAAS/PAAS/SAAS - Implementing Security in AWS.

LIST OF EXPERIMENTS	15

1. Install Virtual box/VMware Workstation with different flavors of Linux or Windows OS on top of windows7 or 8
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java
4. Use GAE launcher to launch the web applications
5. Study and installation of Storage as Service
6. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim
7. Find a procedure to transfer the files from one virtual machine to another virtual machine
8. Find a procedure to launch virtual machine using try stack (Online Open stack Demo Version)
9. User Management in Cloud
10. Securing Servers in Cloud

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Text Book (s)	
1	Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2	Cloud Computing: Principles and paradigms ByRaj Kumar Buyya, James Broberg, Andrezei M.Goscinski, 2011
3	Cloud Computing for dummies, By Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, 2009.
4	Cloud Computing: A Practical Approach, ByAnthony T. Velte, Toby J. Velte, and Robert Elsenpeter, McGraw Hill, 2010.
5	Handbook of Cloud Computing, By Borko Furht, Armando Escalante (Editors), Springer, 2010
Reference (s)	
1	Cloud computing: Implementation, management and security By Rittinghouse, John, W.
2	Cloud Computing Bible, By Barrie Sosinsky, Wiley, 2011.
3	Cloud Computing Architected: Solution Design Handbook by Rhoton, John.
4	Cloud Security, A comprehensive Guide to Secure Cloud Computing by Krutz, Ronald L.; Vines, Russell Dean.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE023T	INTELLECTUAL PROPERTY RIGHTS	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Introduce fundamental aspects of Intellectual Property Rights.
2	Disseminate knowledge on patents, patent regime in India and abroad and registration aspects.
3	Understand the agreements and legislations in IPR.
4	Disseminate knowledge on Digital developments and competitions.
5	Aware about current trends in IPR and Government steps in fostering IPR.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Ability to manage Intellectual Property Portfolio to enhance the value of the firm.
CO2	Review an Intellectual Property Portfolio and comprehend the extent of their protection.
CO3	Develop a business plan that advances the value of their Intellectual Property Portfolio.
CO4	Develop a strategy of marketing their intellectual property and understand some negotiation basics.
CO5	Explain some of the limits of their Intellectual Property Rights and comprehend some basic legal Pitfalls.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	-	3	1	1	-	3	1	-	-	-	2	3
CO2	1	2	-	3	1	1	-	3	1	-	-	-	2	2
CO3	1	2	-	3	1	1	-	3	1	-	-	-	3	3
CO4	1	2	-	3	1	1	-	3	1	-	-	-	3	3
CO5	1	2	-	3	1	1	-	3	1	-	-	-	2	2
CO (Avg)	1	2	-	3	1	1	-	3	1	-	-	-	2.40	2.60

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Introduction to IPRs - Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications - IPR in India and Abroad - Genesis and Development - the way from WTO to WIPO –TRIPS - Nature of Intellectual Property - Industrial Property - Technological Research - Inventions and Innovations - Important examples of IPR.		
UNIT II	**REGISTRATION OF IPRs**	**10**
Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad.		
UNIT III	**AGREEMENTS AND LEGISLATIONS**	**10**
International Treaties and Conventions on IPRs - TRIPS Agreement - PCT Agreement - Patent Act of India - Patent Amendment Act - Design Act - Trademark Act - Geographical Indication Act.		
UNIT IV	**DIGITAL PRODUCTS AND LAW**	**9**
Digital Innovations and Developments as Knowledge Assets - IP Laws, Cyber Law and Digital Content Protection - Unfair Competition - Meaning and Relationship between Unfair Competition and IP Laws - Case Studies.		
UNIT V	**ENFORCEMENT OF IPRs**	**7**
Infringement of IPRs - Enforcement Measures - Emerging issues - Case Studies.		

Text Book (s)

1	V. ScopleVinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012
2	S.V. Satarkar, Intellectual Property Rights and Copy Rights, EssEss Publications, New Delhi, 2002

Reference (s)

1	Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.
2	PrabuddhaGanguli,"Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.
3	Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE024T	INTERNET OF THINGS (Recommended by Infosys)	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn about various IOT related protocols.
2	Explore various simple IoT systems using Arduino and Raspberry Pi.
3	Learn Data Analytics and Cloud in the context of IoT.
4	Understand Internet of Things based solution for real world problems.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Summarize various Protocols and Standards of Internet of Things.
CO2	Understand simple IoT Systems using Arduino.
CO3	Build simple IoT Systems using Raspberry Pi.
CO4	Understand Data Analytics and Cloud in the context of IoT.
CO5	Design and develop Smart Devices using IoT.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
CO2	3	2	2	1	1	2	2	2	2	2	1	2	2	2
CO3	3	2	2	1	1	2	2	2	2	2	1	2	2	2
CO4	3	3	1	1	1	-	-	2	2	2	2	3	2	2
CO5	3	3	3	2	2	3	3	2	2	2	2	3	3	3
CO (Avg)	3	2.50	2	1.25	1.25	2.33	2.33	2	2	2	1.5	2.5	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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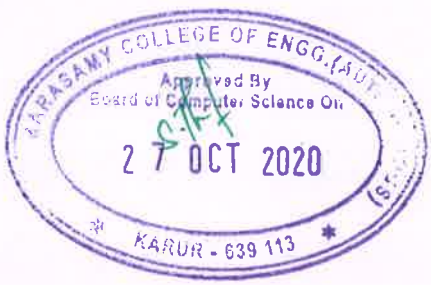
UNIT I	IoT ARCHITECTURE AND ITS PROTOCOLS	9
Evolution of Internet - IoT Architecture - Web 3.0 View of IoT - Protocol Standardisation for IoT- IEEE802.15.1 - IEEE 802.15.4 - BACNet Protocol - Modbus - Zigbee Architecture - CoAP and MQTT.		
UNIT II	**PROGRAMMING IoT USING ARDUINO**	**9**
Basics of Arduino - Setting up - Programming the Board - Reading from Sensors - Connecting Arduino with Mobile Devices - Communication via Bluetooth and USB - Connection with Internet via WIFI/Ethernet.		
UNIT III	**PROGRAMMING IoT USING RASPBERRY PI**	**9**
Installation and Setting up of the Raspberry Pi - Programming the Raspberry Pi - Communication via Bluetooth and USB - Connection with Internet via WIFI/Ethernet.		
UNIT IV	**IoT IN CLOUD AND SECURITY**	**9**
Internet of Things (IoT) as Interconnection of Threats (IoT) - Privacy Preservation for IoT used in Smart Buildings - Authentication in IoT - Cloud and IoT - Cloud Platforms - Data Analytics and Applications.		
UNIT V	**IoT APPLICATIONS**	**9**
IoT Applications - Weather Monitoring system, Forest Fire Detection System, Smart Buildings and Infrastructure, Smart Health, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.		

Text Book (s)

1	CharalamposDoukas,'Building Internet of Things with the Arduino', Create space, April 2012.
2	Donald Norris, 'The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black',Mc.Graw Hill,2015.
3	Fei Hu ,'Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations',CRC press ,2016

Reference (s)

1	Dieter Uckelmann,Mark Harrison,Florian Michahelles, 'Architecting the Internet of Things',Springer,2011
3	CunoPfister, 'Getting Started with the Internet of Things, O'Reilly Media', Inc.,2011
4	Honbo Zhou, 'The Internet of Things in the Cloud: A Middleware Perspective',CRC Press,2012



Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE025J	IOT AND SMART APPLIANCES	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Provide a basic understanding of Internet of Things.
2	Provide hands on training for building simple applications using appropriate Sensors, Microcontroller Board and other Components.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the basics of IoT Eco System.
CO2	Identify the various IoT connecting devices: Arduino, Raspberry Pi, Bluetooth, Wi-Fi.
CO3	Summarize the various IoT communication protocols.
CO4	Understanding the basic programs in Arduino.
CO5	Experiment Various IoT Case Studies.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	-	-	-	-	-	1	1	1
CO2	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO3	3	2	1	-	-	1	1	-	-	-	-	1	2	1
CO4	3	3	1	-	-	1	1	2	2	2	-	2	2	1
CO5	3	3	3	2	2	2	2	2	2	2	2	2	3	3
CO (Avg)	3	2.40	1.40	2	2	1.20	1.25	2	2	2	2	1.40	2	1.40

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO IoT	9
Definition and Characteristics of IoT - IoT Architecture - Basics of Sensors and actuators - Examples and Working Principles of Sensors and Actuators - Microcontroller platform - Setting up the board – Reading data from Sensors.		
UNIT II	**CONNECTIVITY OF IoT DEVICES**	**9**
Wired and Wireless Communication - Communication through Bluetooth - WiFi – Ethernet - Connecting Microcontroller with Mobile Devices - Wireless Sensor Networks - Cloud Computing.		
UNIT III	**IoT ARCHITECTURE AND COMMUNICATION PROTOCOLS**	**9**
IoT reference Model - Zigbee, RFID, WiFi, BACnet, XMPP, AMQP, SOAP, CoAP, MQTT.		
UNIT IV	**PROGRAMMING FOR IoT WITH ARDUINO BOARDS**	**9**
Introduction to ATmega Microcontroller - Architecture of ATmega328 - Types of Arduino Boards - Features of Arduino - Introduction to the Arduino programming environment - Programming with peripherals on the Arduino.		
UNIT V	**CASE STUDY AND IMPLICATIONS**	**9**
Case Studies: IoT in Disaster Management System - Agriculture - Smart City - Home Automation - Industry 4.0 - eGovernance - Transportation & Logistics - Healthcare.		
	LIST OF EXPERIMENTS	**15**

1. Study of IoT Components
2. Study of different Sensors and its Applications
3. Interfacing keyboard and LCD
4. Flashing of LEDs
5. Interfacing Stepper Motor and Temperature Sensor
6. Implementation of Home Automation
7. Implementation of Healthcare

Text Book (s)

1	Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

Reference (s)

1	Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
2	Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things Key applications and Protocols", Wiley, 2012
3	Cuno Pfister, "Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects)", Kindle Edition, 2011
4	Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2012

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Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE026J	MOBILE COMPUTING	3	0	2	4

Prerequisite Course (s)

18CSC206J-Computer Networks

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basic concepts of Mobile Computing.
2	Learn the basics of Mobile Telecommunication System.
3	Be familiar with the Network Layer Protocols and Ad Hoc Networks.
4	Understand the basis of Transport and Application Layer Protocols.
5	Learn the knowledge about different Mobile Platforms and Application Development.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the basics of Mobile Computing Systems.
CO2	Illustrate the generations of Telecommunication Systems in Wireless Networks.
CO3	Explain the Concepts of Mobile Network Layer.
CO4	Explain the functionality of Transport and Application layers.
CO5	Understand the Mobile Application using Android/Blackberry/iOS/Windows SDK.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	1	-	-	3	2
CO2	3	2	1	-	-	-	-	-	-	1	-	-	3	2
CO3	3	1	1	1	-	-		-	-	1	-	-	3	2
CO4	2	2	1	-	-	-	1	-	-	1	-	-	3	2
CO5	3	2	1	-	-	-	2	-	-	1	-	-	3	2
CO (Avg)	2.8	1.8	1	1	-	-	1.5	-	-	1	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Introduction to Mobile Computing - Applications of Mobile Computing - Generations of Mobile Communication Technologies - Multiplexing - Spread Spectrum - MAC Protocols - SDMA - TDMA - FDMA – CDMA.		
UNIT II	**MOBILE TELECOMMUNICATION SYSTEM**	**9**
Introduction to Cellular Systems - GSM - Services & Architecture - Protocols - Connection Establishment - Frequency Allocation - Routing - Mobility Management - Security - GPRSUMTS - Architecture - Handover - Security.		
UNIT III	**MOBILE NETWORK LAYER**	**9**
Mobile IP - DHCP - AdHoc - Proactive protocol - DSDV - Reactive Routing Protocols – DSR, AODV - Hybrid routing - ZRP, Multicast Routing - ODMRP, Vehicular Ad Hoc networks(VANET) - MANET Vs VANET - Security.		
UNIT IV	**MOBILE TRANSPORT AND APPLICATION LAYER**	**9**
Mobile TCP - WAP - Architecture - WDP - WTLS - WTP - WSP - WAE - WTA Architecture – WML.		
UNIT V	**MOBILE PLATFORMS AND APPLICATIONS**	**9**
Mobile Device Operating Systems - Special Constraints & Requirements - Commercial Mobile Operating Systems - Software Development Kit: iOS, Android, BlackBerry, Windows Phone - MCommerce - Structure - Pros & Cons - Mobile Payment System - Security Issues.		
	LIST OF EXPERIMENTS	**15**

1. Android platform and Project Structure
2. Developing a simple Android Application
3. Creating Applications with Multiple Activities and a Simple Menu using ListView
4. Developing an application with the support of activity lifecycle
5. Write an application that uses SQLite Databases
6. Creating activity for parsing the XML file
7. Write an application to implement Fragment
8. Develop an android application that makes use of GPS
9. Media and Camera API
10. Sensor programming

Text Book (s)

1	Jochen Schiller, —Mobile Communicationsl, PHI, Second Edition, 2003
2	Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile Computingl, PHI Learning Pvt.Ltd, New Delhi – 2012

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Reference (s)	
1	Dharma PrakashAgarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005
2	UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, —Principles of Mobile Computing, Springer, 2003.
3	William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital Systems,Second Edition,TataMcGraw Hill Edition ,2006.
4	C.K.Toh, —AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.
5	Android Developers : http://developer.android.com/index.html

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE027T	PARALLEL COMPUTING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the need and fundamentals of Parallel Computing Paradigms.
2	Learn the nuances of Parallel Algorithm design.
3	Understand the programming principles in Parallel Computing Architectures.
4	Learn few problems that are solved using Parallel Algorithms.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss about the fundamentals of Parallel Computing.
CO2	Understand the ways to minimize the challenges in Parallel Computing.
CO3	Describe shared memory models and open MP programming.
CO4	Use the skills in MPI programming.
CO5	Understand the heterogeneous processors and its programming.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-		-	-	-	-	-	-	-	3	2
CO2	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO3	2	2	1	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	1	-	-	-	-	-	-	-	-	-	2	2
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	2
CO (Avg)	2.60	2	1	-	-	-	-	-	-	-	-	-	2.60	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FUNDAMENTALS OF PARALLEL COMPUTING	9
Need for Parallel Computing - Parallel Computer Models - ILP, TLP and Data Parallelism - Parallel Programming Overview - Processes, Tasks and Threads - Parallel Programming Models - Shared Memory Programming - Message Passing Paradigm - Interaction and Communication - Interconnection Networks.		
UNIT II	**CHALLENGES OF PARALLEL COMPUTING**	**9**
Identifying Potential Parallelism - Techniques for Parallelizing Programs - Issues - Cache Coherence issues - Memory Consistency Models - Maintaining Memory Consistency - Synchronization Issues - Performance Considerations.		
UNIT III	**SHARED MEMEORY MODELS AND OPEN MP PROGRAMMING**	**9**
Open MP Execution Model - Memory Model and Consistency - Open MP Directives - Run Time Library Routines - Handling Data and Functional Parallelism - Performance Considerations.		
UNIT IV	**MPI PROGRAMMING**	**9**
MPI Programming Model - MPI Basics - Circuit Satisfiability - Global Operations - Asynchronous Communication - Collective Communication - Other MPI Features - Performance Issues - Combining Open MP and MPI.		
UNIT V	**PROGRAMMING HETEROGENEOUS PROCESSORS**	**9**
GPU Architecture - Basics of CUDA - CUDA Threads - CUDA Memories - Synchronization Handling - Performance Issues - Application Development. Introduction to OpenCL.		

Text Book (s)	
1	John L. Hennessey and David A. Patterson, "Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, 5th. Edition, 2012.
2	Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan Kaufmann, 2011.
Reference (s)	
1	AnanthGrama, George Karypis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", Second Edition, Pearson Education Limited, 2003.
2	ShameemAkhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.
3	Ian Foster, "Designing and Building Parallel Programs: Concepts and Tools for Parallel Software Engineering", Addison Wesley Longman Publishing Co., USA, 1995
4	David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A hardware/ Software approach" , Morgan Kaufmann / Elsevier Publishers, 1999.
5	OpenMP Programmer's Manual

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Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE028J	PYTHON PROGRAMMING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basic constructs of Python programming language.
2	Make use of Functions, String and Collections.
3	Understand various OOPs concepts and File handling techniques.
4	Develop GUI applications using Tkinter and Database Connectivity.
5	Learn the basics of Numpy and Pandas.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the basic constructs of Python programming language.
CO2	Solve problems using Function, String and Collections.
CO3	Demonstrate various OOPs concepts and File handling techniques.
CO4	Develop GUI applications using Tkinter and Database Connectivity.
CO5	Make use of Numpy and Pandas Libraries to solve real world problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	2	-	-	1	-	1	-	1	3	3
CO2	3	3	3	2	2	-	-	1	-	1	-	1	3	3
CO3	2	2	2	1	2	-	-	1	-	1	-	1	3	3
CO4	3	3	3	2	2	-	-	1	2	1	-	1	3	3
CO5	3	3	3	2	2	-	-	1	2	1	-	1	3	3
CO (Avg)	2.60	2.60	2.60	1.6	2	-	-	1	2	1	-	1	3	3

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	PYTHON INTRODUCTION	9
Introduction to Python Programming - Python Interpreter and Interactive mode - Values and Types: int, float, Boolean, string, and list - variables - expressions - statements - Boolean values and operators - Precedence of operators - Comments - Conditionals: Conditional (if), alternative (if-else), chained conditional (if-elif-else) - Iteration: while, for, Nested loops - Loop controlled statements: break, continue, pass.		
UNIT II	**FUNCTIONS , STRING AND COLLECTIONS**	**9**
Functions: return values, parameters, arguments, local and global scope - Function composition - Recursion - Lambda function - Strings: string functions and methods - List: operations and methods - Tuple: operations and methods - Dictionary: operations and methods - Set: operations and methods - Errors and Exceptions - Exception Handling.		
UNIT III	**OOPs CONCEPTS AND FILE HANDLING**	**9**
Object Oriented Programming: Class - Object – Methods - Constructors - Inheritance: Subclasses and Overloading - Overriding Methods - Data Encapsulation - Polymorphism - Files and exception: text files, reading and writing files, format operator - Command line arguments.		
UNIT IV	**GUI PROGRAMMING AND DATABASE CONNECTIVITY**	**9**
Database Connectivity: MySql connections, Basic operations and Data manipulations - Python JSON - GUI programming: Introduction to Tkinter - Top Level Widget controls: Frames, Menus, Messages, and Entry controls - Python RegEx.		
UNIT V	**PYTHON FOR DATA SCIENCE**	**9**
Data Science: Introduction to Data Science - Data Science Libraries - Numpy: Data types-Functions - Pandas: Data frames - operations		
	LIST OF EXPERIMENTS	**15**

1. Python program using Input and Output function
2. Python program using Control Flow Statements and Functions
3. Python program to implement various operations on String
4. Python program to implement various operations on List
5. Python program to implement various operations on Set
6. Python program to implement various operations on Dictionary
7. Python program to implement various operations on Tuples
8. Python Program using Database Connectivity
9. GUI Programming using Tkinter
10. Program using Numpy and Pandas

Text Book (s)

1 Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)

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2	Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
Reference (s)	
1	Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.
2	Mark Lutz ,"Learning Python", O Reily, 4thEdition, 2009, ISBN: 978-0-596-15806-4
3	Mark Lutz ,"Programming Python ", O Reily, 4thEdition, 2010, ISBN 9780596158118
4	Tim Hall and J-P Stacey ,"Python 3 for Absolute Beginners" , 2009, ISBN:9781430216322
5	Magnus Lie Hetland , "Beginning Python: From Novice to Professional", 2nd Edition, 2009, ISBN:9781590599822

Regulation 2018		-	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE029J	SIMULATION AND MODELLING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Introduce the salient features and models of Simulation systems.
2	Provide the exposure in input and output data analysis through various Statistical models.
3	Elucidate the fundamentals of Data collection and Statistical models in Simulation.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the fundamentals of Simulation and its principles.
CO2	Apply the Simulation and Modelling concepts in real time problems.
CO3	Analyze the input data using Statistical models.
CO4	Analyze the output data using Statistical models.
CO5	Apply the Simulation and Modelling concepts in Inventory systems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	2	1	-	1	3	3
CO2	3	3	2	2	2	-	-	-	2	1	-	1	3	3
CO3	3	3	3	3	2	-	-	-	2	1	-	1	3	3
CO4	3	3	3	3	2	-	-	-	2	1	-	1	3	3
CO5	3	3	2	3	2	-	-	-	2	1	-	1	3	3
CO (Avg)	3	3	2.40	2.75	2	-	-	-	2	1	-	1	3	3

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9

Simulation: Advantages - Disadvantages - Areas of Application - System Environment - Components of a System - Model of a System - Types of Models - Steps in a Simulation Study - Simulation Examples: Simulation of Queuing Systems and Other simulation examples - General Principles: Concepts in Discrete - Event Simulation - Event scheduling / Time Advance Algorithm - Simulation using Event Scheduling.

UNIT II	SIMULATION MODELS	9

Statistical Models in Simulation - Review of terminology & concepts - Useful statistical models - Discrete distributions - Continuous distributions - Process - Empirical distributions - Queuing Models: Characteristics of Queuing Systems - Queuing Notation - Transient & Steady State behaviour of Queuing Notation - Transient & Steady State behaviour of Queues - Long run measures of performance of Queuing Systems - Steady-State behaviour of finite population models.

UNIT III	INPUT DATA ANALYSIS	9

Input Modelling: Data collection - Identification and distribution with data - Parameter Estimation - Goodness of fit tests - Selection of input models without data - Multivariate and Time series analysis. Verification and Validation of Model: Model Building – Verification - Calibration and Validation of Models.

UNIT IV	OUTPUT DATA ANALYSIS	9

Output Analysis - Types of Simulations with Respect to Output Analysis - Stochastic Nature of output data - Measures of performance and their estimation - Output analysis of terminating simulation - Output analysis of steady state simulations. Comparison and Evaluation of alternative system designs: Comparison of two and several system designs - Statistical models for estimating the effect of design alternatives.

UNIT V	INVENTORY SYSTEMS	9

Inventory Systems - Measures of effectiveness - Inventory policies - Deterministic systems and Probabilistic systems - Simulation in Inventory Analysis. Random Number Generation: Properties of Random numbers - Generation of Pseudo - Random Numbers - Techniques for generating Random numbers - Tests for Random numbers - Random Variable Generation: Inverse Transforms Technique - Direct Transformation for the Normal Distribution - Convolution method – Acceptance - Rejection Technique.

LIST OF EXPERIMENTS	15

1. Case Study on GPSS, SIMULA and UGRIP
2. Computer Generation of Random Numbers
3. Chi-square goodness-of-fit test
4. Test for Standard Normal Distribution
5. Testing Random Number Generators
6. Simulation of Inventory Systems using Spreadsheet
7. Simulation of Single Server Queuing System

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8. Simulation of Two-Server Queuing System 9. Simulation of LAN 10. Simulation of Hospital System	
Text Book (s)	
1	Jerry Banks, John S. Carson, Discrete-event System Simulation, PHI, 5 th Edition, 2009
2	Karian, Z.A. and Dvdewicz. E.J., Modern Statistical Systems and GPSS Simulation, Freeman, 1998.
Reference (s)	
1	Mohsen Guizani, AmmarRayes, Bilal Khan, Ala Al-Fugaha, —Network Modelling and Simulation A Practical Perspectivel, John Wiley, 2010.
2	Averil M Law , "Simulation Modelling and Analysis", Tata McGraw Hill,2014.

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE030T	SOFT COMPUTING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basic concepts of Soft Computing Frameworks.
2	Understand the concepts of Neural Networks.
3	Be exposed to Fuzzy Arithmetic and Fuzzy Set in Fuzzy Systems.
4	Learn the concepts of Genetic algorithms and its constraints.
5	Be exposed to Hybrid systems and Soft Computing Tools.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand Soft Computing Frameworks.
CO2	Learn the concepts of Artificial Neural Networks.
CO3	Explain the logics of Fuzzy systems and Fuzzy Arithmetic.
CO4	Explain the concepts of Genetic Algorithm in Intelligent Systems.
CO5	Understand the Hybrid Systems in solving Real time problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	1	1	-	1	3	2
CO2	3	2	1	1	-	-	-	-	1	1	-	1	3	2
CO3	3	2	1	1	-	-	-	-	1	1	-	1	3	2
CO4	3	2	1	1	-	-	-	-	1	1	-	1	3	2
CO5	3	2	1	1	-	-	-	-	1	1	-	1	3	2
CO (Avg)	3	2	1	1	-	-	-	-	1	1	-	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO SOFT COMPUTING	9
Introduction-Artificial Intelligence - Artificial Neural Networks - Fuzzy Systems - Genetic Algorithm and Evolutionary Programming - Swarm Intelligent Systems - Classification of ANNs - McCulloch and Pitts Neuron Model - Learning Rules: Hebbian and Delta- Perceptron Network - Adaline Network - Madaline Network.		
UNIT II	**ARTIFICIAL NEURAL NETWORKS**	**9**
Back propagation Neural Networks - Kohonen Neural Network - Learning Vector Quantization - Hamming Neural Network - Hopfield Neural Network - Bi-directional Associative Memory - Adaptive Resonance Theory Neural Networks - Support Vector Machines - Spike Neuron Models.		
UNIT III	**FUZZY SYSTEMS**	**9**
Introduction to Fuzzy Logic - Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations - Membership Functions - Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.		
UNIT IV	**GENETIC ALGORITHMS**	**9**
Genetic Algorithm and Search Space - General Genetic Algorithm - Operators - Generational Cycle - Stopping Condition - Constraints - Classification - Genetic Programming – Multilevel Optimization – Real Life Problem- Advances in GA.		
UNIT V	**HYBRID SYSTEMS**	**9**
Hybrid Systems - Neural Networks, Fuzzy Logic and Genetic - GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP - Inference by Fuzzy BP - Fuzzy Art Map: A Brief Introduction - Soft Computing Tools - Genetic Algorithms in Fuzzy Logic Controller Design - Fuzzy Logic Controller		

Text Book (s)

1	N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2	S.N.Sivanandam ,S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.
3	S.Rajasekaran, G.A.VijayalakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.

Reference (s)

1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, —Neuro-Fuzzy and Soft Computing, Prentice-Hall of India, 2002.
2	KwangH.Lee, —First course on Fuzzy Theory and Applications, Springer, 2005.
3	George J. Klir and Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice Hall, 1996.
4	James A. Freeman and David M. Skapura, —Neural Networks Algorithms, Applications, and Programming Techniques, Addison Wesley, 2003.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE031T	SOFTWARE ENGINEERING	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand detailed concepts related to software engineering life cycle.
2	Learn about the software engineering requirements and metrics in process and project domains.
3	Gain knowledge about the concepts of software designing and testing.
4	Acquire knowledge about an overview of object oriented life cycle, methodology and UML.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify a suitable software development life cycle model for an application.
CO2	Determine the software requirements specification and cost estimation for an application.
CO3	Interpret the design models and various testing techniques for implementing software.
CO4	Learn the Object Orientation concepts in Software Development.
CO5	Summarize the concepts of Object Oriented methodologies and Unified Modeling Language in Software development.

CO–PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	2	2	-	1	3	3
CO2	3	2	2	1	-	-	-	-	2	2	2	1	3	3
CO3	3	2	2	1	-	-	-	-	3	3	-	1	3	3
CO4	3	2	2	1	-	-	-	-	2	2	-	1	3	3
CO5	3	2	2	1	-	-	-	-	3	3	-	1	3	3
CO (Avg)	3	2	2	1	-	-	-	-	2.4	2.4	2	1	3	3

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	SOFTWARE PROCESS MODELS	9
The Nature of Software - Software Process Models - Waterfall Model - Incremental Process Models - Evolutionary Process Models - Prototyping - Spiral Model - Concurrent Model - Introduction to Agile Process.		
UNIT II	**REQUIREMENT ENGINEERING**	**9**
Requirements Engineering - Establishing the Groundwork - Eliciting Requirements - Building the Requirements Model - Requirements Analysis - Metrics in the Process and Project Domains - Software Measurements - Metrics for Software Quality - Software Project Estimation - Decomposition Techniques - Empirical Estimation Models - The Make/Buy Decision.		
UNIT III	**DESIGN CONCEPTS AND TESTING**	**9**
The Design Concepts - The Design Model - Architectural Design - User Interface Design: Interface Analysis - Interface Design Steps - Requirements Modeling - Software Testing Fundamentals - Black Box Testing - White Box Testing - Unit Testing - Integration Testing.		
UNIT IV	**OBJECT ORIENTED LIFE CYCLE**	**9**
Overview of Object Oriented Systems Development - Object Oriented System Development Methodology - Object Orientation - Unified Approach - Object Basics - Object Oriented Systems Development Life Cycle.		
UNIT V	**OBJECT ORIENTED METHODOLOGY AND UML**	**9**
Object Oriented Methodologies - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Unified Approach - Unified Modeling Language - Use Case - Class Diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram.		

Text Book (s)

1	R.S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, McGraw HillInternational Edition, 2014.
2	Ali Bahrami, Object Oriented Systems Development, Tata McGraw-Hill, 2010

Reference (s)

1	Ian Sommerville, Software Engineering, 8th Edition, Pearson Education,2008.
2	Stephan Schach, Software Engineering, Tata McGraw Hill, 2007
3	Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson Education, second edition, 2001
4	Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw - Hill, 2003.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE032T	SOFTWARE PROJECT MANAGEMENT	3	0	0	3

Prerequisite Course (s)

18CSE031T- Software Engineering / 18CSE002T Agile Methodology

Course Objective (s):

The purpose of learning this course is to:

1	Learn the need for Software Project Management.
2	Highlight different techniques for Software Cost Estimation.
3	Make the students to understand Activity Planning and Risk Management.
4	Make the students to Manage and Control Projects.
5	Make the students to understand how to manage people in an organization.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Estimate project cost and perform Cost-Benefit evaluation among projects.
CO2	Apply quality models in software projects for maintaining software quality and reliability.
CO3	Perform project scheduling, activity network analysis and risk management.
CO4	Apply schedule and cost control techniques for project monitoring including contract management.
CO5	Use suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	3	1	-	1	3	2	2	1	3	2
CO2	3	3	2	2	3	1	-	1	3	2	2	1	3	2
CO3	3	3	2	2	3	1	-	1	3	2	2	1	3	2
CO4	3	3	2	2	3	1	-	1	3	2	2	1	3	2
CO5	3	3	2	2	3	1	-	1	3	2	2	1	3	2
CO (Avg)	3	3	2	2	3	1	-	1	3	2	2	1	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	PROJECT EVALUATION AND PROJECT PLANNING	9
Importance of Software Project Management - Activities Methodologies - Categorization of Software Projects - Setting objectives - Management Principles - Management Control - Project Portfolio Management - Cost-Benefit Evaluation Technology - Risk Evaluation - Strategic Program Management - Stepwise Project Planning.		
UNIT II	**PROJECT LIFE CYCLE AND EFFORT ESTIMATION**	**9**
Software process and Process Models - Choice of Process models - Mental Delivery - Rapid Application Development - Agile methods - Extreme Programming - SCRUM - Managing Interactive Processes - Basics of Software Estimation - Effort and Cost estimation techniques - COSMIC Full function points - COCOMO II a Parametric Productivity Model - Staffing Pattern.		
UNIT III	**ACTIVITY PLANNING AND RISK MANAGEMENT**	**9**
Objectives of Activity planning - Project schedules - Activities - Sequencing and scheduling - Network Planning models - Forward Pass & Backward Pass techniques - Critical path (CRM) method - Risk identification - Assessment - Monitoring - PERT technique - Monte Carlo Simulation - Resource Allocation - Creation of Critical Patterns - Cost schedules. Case Study- (MyCollab)		
UNIT IV	**PROJECT MANAGEMENT AND CONTROL**	**9**
Framework for Management and control - Collection of Data Project termination - Visualizing progress - Cost Monitoring - Earned Value Analysis - Project tracking - Change control - Software Configuration Management - Managing contracts - Contract Management.		
UNIT V	**STAFFING IN SOFTWARE PROJECTS**	**9**
Managing people - Organizational behaviour - Best methods of staff selection - Motivation - Oldham-Hackman job characteristic model - Ethical and Programmed concerns - Working in teams - Decision making - Team structures - Virtual teams - Communications genres - Communication plans.		

Text Book (s)

1	Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

Reference (s)

1	Robert K. Wysocki "Effective Software Project Management" – Wiley Publication, 2011.
2	Walker Royce: "Software Project Management"- Addison-Wesley, 1998.
3	Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.
4	Royce, "Software Project Management", Pearson Education, 1999.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE033T	SOFTWARE TESTING (Recommended by Infosys)	3	0	0	3

Prerequisite Course (s)

18CSE031T- Software Engineering / 18CSE002T Agile Methodology

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basics of Testing, Test planning & Design and Test team organization.
2	Study the various types of test in the life cycle of the Software Product.
3	Build design concepts for System Testing and Execution.
4	Understand Test Management and Test Automation techniques.
5	Apply Test Metrics and Measurements.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the Test plan, Design test cases and Team development.
CO2	Design test cases suitable for a Software Development for different domains.
CO3	Perform functional and Non Functional tests in the life cycle of the Software Product.
CO4	Understand System Testing and Test Execution Process.
CO5	Understand the Test Automation using Automation Tools.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	2	1	-	1	3	1	1	1	3	2
CO2	3	3	2	1	2	1	-	1	3	1	1	1	3	2
CO3	3	3	2	1	2	1	-	1	3	1	1	1	3	2
CO4	3	3	2	1	2	1	-	1	3	1	1	1	3	2
CO5	3	3	2	1	2	1	-	1	3	1	1	1	3	2
CO (Avg)	**3**	**3**	**2**	**1**	**2**	**1**	**-**	**1**	**3**	**1**	**1**	**1**	**3**	**2**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Testing as an Engineering Activity - Testing as a Process - Testing Maturity Model - Testing axioms - Basic definitions - Software Testing Principles - Tester's Role in a Software Development Organization - Origins of Defects - Cost of defects - Defect Classes - Defects life cycle - Using Bugzilla for logging and tracing defects.		
UNIT II	**TEST CASE DESIGN STRATEGIES**	**9**
Test case Design Strategies - Using Black Box Approach to Test Case Design - Boundary Value Analysis - Equivalence Class Partitioning - State based Testing - Cause-effect graphing - Compatibility Testing - User Documentation Testing - Domain Testing - Random Testing - Requirements based Testing - Using White Box Approach to Test design - Test Adequacy Criteria - Static Testing vs. Structural Testing - Code Functional Testing - Coverage and Control Flow Graphs - Covering Code Logic – Paths – Code Complexity Testing - Additional White box testing approaches - Evaluating Test Adequacy Criteria.		
UNIT III	**LEVELS OF TESTING**	**9**
The need for Levels of Testing - Unit Test - Unit Test Planning - Designing the Unit Test - Test Harness - Running the Unit test and Recording results - Integration Test - Designing Integration Test - Integration Test Planning - Scenario Testing - Defect Bash Elimination System Testing - Acceptance testing - Performance Testing - Regression Testing - Internationalization testing - Ad-hoc testing - Alpha, Beta Tests - Testing OO systems - Usability and Accessibility testing - Configuration testing - Compatibility testing - Testing the documentation - Website Testing.		
UNIT IV	**TEST MANAGEMENT**	**9**
People and Organizational issues in testing - Organization Structures for testing teams - Testing Services - Test Planning - Test Plan Components - Test Plan Attachments - Locating Test Items - Test Management -Test Process - Reporting Test Results - Creating sample test data using MS-Excel.		
UNIT V	**TEST AUTOMATION**	**9**
Software Test Automation using Selenium IDE - Skills needed for Automation - Scope of Automation - Design and Architecture for Automation - Requirements for a Test Tool - Challenges in Automation - Test Metrics and Measurements - Project, Progress and Productivity metrics.		

Text Book (s)

1	Software Testing – Principles and Practices, Naresh Chauhan, Oxford University Press, 2010
2	Srinivasan Desikan and Gopalaswamy Ramesh, —Software Testing – Principles and Practices, Pearson Education, 2006.

Reference (s)

1	Effective Methods for Software Testing, Third edition, William E. Perry, Wiley India, 2009
2	Testing Computer Software, Cem Kaner, Jack Falk, Hung Quoc Nguyen, Wiley India, rp2012.
3	Software Testing – Principles, Techniques and Tools, M.G.Limaye, Tata McGraw-Hill, 2009.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE034T	TCP / IP AND INTERNET PROGRAMMING	3	0	0	3

Prerequisite Course (s)

18CSC206J - Computer Networks

Course Objective (s):
The purpose of learning this course is to:

1	Understand basics of TCP / IP Layers.
2	Learn the essential of ARP, IP and DHCP Protocols.
3	Understand the simple Socket Programming in TCP.
4	Describe the performance of TCP Socket Programming.
5	Learn the Socket Programming in IPv4 and IPv6.

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Understand the Basics of Networking with IEEE Standards.
CO2	Illustrate various protocols header formats and its operations.
CO3	Discuss the basics of TCP/IP Socket Programming with functions.
CO4	Describe Stream Socket establishment and various I/O Models.
CO5	Summarise IPV4, IPv6 Interoperability & Raw Socket Development.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO2	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO3	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO4	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO5	3	2	2	-	-	-	-	1	1	1	-	1	2	1
CO (Avg)	3	2	2	-	-	-	-	1	1	1	-	1	2	1

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	NETWORKING TCP/IP LAYERS	9
Introduction - Architecture and Protocol of TCP/IP Suite - Designing application - Internet Address Architecture - Link Layer Services - IEEE 802.3 - IEEE 802.11 - PPP Protocol.		
UNIT II	**ARP , IP AND DHCP**	**9**
ARP - ARP Frame Format - Proxy ARP - IPv4 and IPv6 Headers - Mobile IP - Dynamic Host Configuration Protocol - DHCP Protocol operation - DHCPv6 - Stateless Address Auto Configuration.		
UNIT III	**ELEMENTARY OF TCP SOCKETS**	**9**
Introduction to Socket Programming - Overview of TCP/IP Protocols - Introduction to Sockets -Socket address Structures - Byte ordering functions - Address conversion functions - Elementary TCP Sockets - socket, connect, bind, listen, accept, read, write, close functions - Iterative Server - Concurrent Server.		
UNIT IV	**APPLICATION DEVELOPMENT**	**9**
TCP Echo Server - TCP Echo Client - POSIX Signal handling - Server with multiple clients - Boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown - I/O multiplexing - I/O Models - Select function - Shutdown function - TCP Echo Server (with multiplexing) - Poll function - TCP Echo Client (with Multiplexing).		
UNIT V	**ADVANCED SOCKETS**	**9**
Ipv4 and Ipv6 Interoperability - Threaded Servers - Thread Creation and Termination - TCP Echo Server using threads - Mutex - Condition variables - Raw Sockets - Raw Socket creation - Raw Socket output - Raw Socket input - Ping program - Trace Route Program.		

Text Book (s)

1	TCP/IP illustrated, Volume 1: The Protocols, W. Richard Stevens, W. Richard Stevens, Pearson Education Asia, 2002
2	W. Richard Stevens, "Unix Network Programming Vol-I", Second Edition, Pearson Education, 1998.

Reference (s)

1	D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Second Edition, Pearson Education, 2006
2	Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4thEdition) by Douglas E. Comer ,Pearson EducationAsia,2000
3	Internetworking with TCP/IP, Vol. III: Client-Server Programming and Applications, Linux/Posix Sockets Version, Douglas E. Comer, David L. Stevens, Michael Evangelista , Pearson EducationAsia,2000
4	Ed Tittel, Laura Chappell, Guide to TCP/IP, Third Edition. Course Technology Incorporated, 2007, ISBN: 1-4188-3755-5. ISBN-13: 978-1-4188-3755-6
5	www.course.com/networking/TCP-IP3e.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE035T	USER INTERFACE TECHNOLOGIES - PART I (Recommended by Infosys)	3	0	0	3

Prerequisite Course (s)

18CSC303J - Web Programming

Course Objective (s):

The purpose of learning this course is to:

1	Know the concepts and architecture of the World Wide Web.
2	Understand and practice Markup Language.
3	Learn and practice Embedded Dynamic Scripting on Client-side Internet Programming.
4	Understand and practice Web Development Techniques on client-side.
5	Know the concepts and architecture of the World Wide Web.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the functionalities of World Wide Web.
CO2	Explore Markup language features and create Interactive Web Pages.
CO3	Design Client-side validation using Scripting Languages.
CO4	Make use of Open source JavaScript Libraries.
CO5	Able to design Front-End Web Page.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	-	-	1	1	-	-	1	2	2
CO2	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO3	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO4	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO5	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO (Avg)	3	2.8	1.8	-	2.6	-	-	1	1	-	-	1	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO WWW	6
Introduction to Computer networks - Internet Standards - Introduction to WWW - WWW Architecture - SMTP - POP3 - File Transfer Protocol - Overview of HTTP - HTTP request - response - Generation of Dynamic Web Pages.		
UNIT II	**UI DESIGN**	**12**
HTML5: Features of HTML5 – Semantic Tags – New Input Elements and tags - Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features – Geolocation API - Web storage (Session and local storage). CSS3: Features of CSS3 - Implementation of border radius, box shadow, image border, custom web font, and backgrounds - Advanced text effects (shadow) - 2D and 3D Transformations - Transitions to elements - Animations to text and elements.		
UNIT III	**RESPONSIVE WEB DESIGN (RWD)**	**9**
Responsive Design: Introduction to RWD and its Techniques - Fluid Layout, Fluid Images and Media queries - Introduction to RWD Framework -Twitter Bootstrap - Bootstrap Background and Features - Getting Started with Bootstrap - Demystifying Grids - Off Canvas - Bootstrap Components - JS Plugins – Customization		
UNIT IV	**INTRODUCTION TO JAVASCRIPT**	**12**
Introduction - Core features - Data types and Variables - Operators, Expressions and Statements - Functions & Scope - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling - Browser Object Model - Windows and Documents - Form handling and validations - Object Oriented Techniques in JavaScript - Classes - Constructors and Prototyping (Sub classes and Super classes) - JSON - Introduction to AJAX.		
UNIT V	**INTRODUCTION TO JQUERY**	**6**
Introduction - jQuery Selectors - jQuery HTML - Animations - Effects - Event Handling - DOM -jQuery DOM Traversing, DOM Manipulation - jQuery AJAX		

Reference (s)

1	Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011.
2	Achyut S Godbole and Atul Kahate, "Web Technologies", Second Edition, Tata McGraw Hill, 2012.
3	Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
4	David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
5	Bear Bibeault and Yehuda Katz, "jQuery in Action", January 2008
6	Web link for Responsive Web Design - https://bradfrost.github.io/this-is-responsive/
7	Ebook link for JavaScript - https://github.com/jasonzhuang/tech_books/tree/master/js

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE036T	USER INTERFACE TECHNOLOGIES – PART II (Recommended by Infosys)	3	0	0	3

Prerequisite Course (s)

18CSE035T - User Interface Technologies - Part I

Course Objective (s):

The purpose of learning this course is to:

1	Learn and practice NoSQL MongoDB Database.
2	Understand and practice Server-side JS Framework.
3	Learn the concepts and need of TypeScript.
4	Understand and practice the basic of Angular 4.0
5	Learn and Practice Forms and Routing in Angular JS.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Implement NoSQL Database CURD operations.
CO2	Make use of Server-side JS framework to make Database Connectivity.
CO3	Describe various concepts in TypeScript.
CO4	Explore Angular features and create component based Web pages .
CO5	Design Front-end Web pages using Forms.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO2	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO3	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO4	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO5	3	3	2	-	3	-	-	1	1	-	-	1	2	2
CO (Avg)	3	3	2	-	3	-	-	1	1	-	-	1	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO NOSQL DATABASE - MONGODB	9
NoSQL Database - Use of MongoDB - Difference between MongoDB and RDBMS - Download and Installation - Common Terms in MongoDB – Implementation of Basic CRUD Operations using MongoDB		
UNIT II	**INTRODUCTION TO SERVER-SIDE JS FRAMEWORK NODE.JS**	**9**
Introduction to Node JS - Architecture - Feature of Node JS - Installation and setup - Creating web servers with HTTP (Request and Response) - Event Handling - GET and POST implementation - Connect to NoSQL Database using Node JS - Implementation of CRUD operations.		
UNIT III	**INTRODUCTION TO TYPESCRIPT**	**9**
TypeScript : Introduction to TypeScript - Features of TypeScript - Installation setup - Variables - Data types - Enum - Array - Tuples - Functions - OOPs concepts - Interfaces - Generics - Modules - Namespaces - Decorators - Compiler options - Project Configuration.		
UNIT IV	**INTRODUCTION TO CLIENT-SIDE JS FRAMEWORK – BASICS OF ANGULAR 4.0**	**9**
Introduction to Angular 4.0 - Needs & Evolution - Features - Setup and Configuration - Components and Modules - Templates - Change Detection - Directives - Data Binding - Pipes - Nested Components.		
UNIT V	**INTRODUCTION TO CLIENT-SIDE JS FRAMEWORK – FORMS AND ROUTING IN ANGULAR 4.0**	**9**
Template Driven Forms - Model Driven Forms or Reactive Forms - Custom Validators - Dependency Injection - Services - RxJS Observables - HTTP - Routing.		

Reference (s)

1	Nathan Rozentals, "Mastering TypeScript", April 2015
2	Nate Murray, Felipe Coury, Ari Lerner and Carlos Taborda, "ng-book, The Complete Book on Angular 4" September 2016
3	Amol Nayak, "MongoDB Cookbook Paperback" , November 2014
4	Krasimir Tsonev, "Node.js by Example Paperback", May 2015
5	Web link for TypeScript: https://www.typescriptlang.org/
6	Web link for Angular4.0: https://angular.io/
7	Web link for Node.js : https://nodejs.org/en/
8	Web link for MongoDB: https://www.mongodb.com/

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18CSE037T	VISUALIZATION TECHNIQUES	3	0	0	3

Prerequisite Course (s)

18CSC301J - Machine Learning

Course Objective (s):

The purpose of learning this course is to:

1	Learn about the fundamentals of Visualizations and its Techniques.
2	Study the Interaction Techniques in Information Visualization fields.
3	Understand various Abstraction mechanisms.
4	Create Interactive Visual Interfaces.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the basics of Data Visualization and principle of Perception.
CO2	Summarize the concept of Computer Visualization.
CO3	Make use of various Multidimensional Visualization Techniques in real time system.
CO4	Summarize the basics of textual methods of Abstraction.
CO5	Illustrate the Animation Design for the real time systems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	-	-	-	-	2	-	1	2	2
CO2	3	2	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	3	2	-	-	-	-	-	-	-	-	1	2	2
CO4	3	2	-	-	-	-	-	-	-	2	-	-	2	2
CO5	3	1	2	-	-	2	-	-	-	-	-	-	2	2
CO (Avg)	3	2	2	1	-	2	-	-	-	2	-	1	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	FOUNDATIONS FOR DATA VISUALIZATION	9
Introduction to Visualization - Visualization stages - Experimental Semiotics based on Perception - Gibson's Affordance theory - A Model of Perceptual Processing - Costs and Benefits of Visualization - Types of Data.		
UNIT II	**COMPUTER VISUALIZATION**	**9**
Non-Computer Visualization - Computer Visualization: Exploring Complex Information Spaces - Fisheye Views - Applications - Comprehensible Fisheye views - Fisheye views for 3D data - Non Linear Magnification - Comparing Visualization of Information Spaces - Abstraction in computer Graphics - Abstraction in user interfaces.		
UNIT III	**MULTIDIMENSIONAL VISUALIZATION**	**9**
1D, 2D, 3D - Multiple Dimensions - Trees - Web Works - Data Mapping: Document Visualization - Workspaces.		
UNIT IV	**TEXTUAL METHODS OF ABSTRACTION**	**9**
From Graphics to Pure Text - Figure Captions in Visual Interfaces - Interactive 3D illustrations with images and text - Related work - Consistency of rendered images and their textual labels - Architecture - Zoom techniques for illustration purpose - Interactive handling of images and text.		
UNIT V	**ABSTRACTION IN TIME AND INTERACTIVE SYSTEMS**	**9**
Animating non Photo realistic Computer Graphics - Zoom Navigation in User Interfaces - Rendering Gestural Expressions - Tactile Maps for Blind People - Synthetic holography - Abstraction Versus Realism - Integrating Spatial and Non Spatial Data.		

Text Book (s)

1	Colin Ware "Information Visualization Perception for Design", 3rd edition, Morgan Kaufman 2012.
2	Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers, 1999.
3	Thomas Strothotte, "Computer Visualization–Graphics Abstraction and Interactivity", Springer Verlag Berlin Heiderberg 1998.

Reference (s)

1	Chaomei Chan, "Information Visualization",Beyond the horizon, 2nd edition, Springer Verlag, 2004.
2	Pauline Wills, "Visualisation: A Beginner's Guide", Hodder and Stoughlon, 1999.
3	Benedikt. M, "Cyberspace: FirotSteps",MIT Press, 1991

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18CSO001T	BASICS OF DATA STRUCTURES AND ALGORITHMS	3	0	0	3

Prerequisite Course (s)

18CSS101J / 18CSS101J(R) - Programming for Problem Solving

Course Objective (s):

The purpose of learning this course is to:

1	Impart the basic concepts of data structures and algorithms.
2	Understand basic concepts about Stack, Queue, List, Tree and Graph.
3	Understand concepts about Searching and Sorting techniques.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the Fundamentals of Algorithms.
CO2	Illustrate List, Stack and Queue ADT with its applications.
CO3	Summarize the basic operations in Binary Tree, Binary Search and AVL Tree.
CO4	Solve the graph problem using various Graph Algorithms.
CO5	Apply various Sorting and Searching Algorithms for solving problems.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	3	-	-	-	3	1	-	-		
CO2	3	3	2	2	3	-	-	-	3	-	-	-		
CO3	3	3	2	2	3	-	-	-	3	--	-	-		
CO4	3	3	2	2	3	-	-	-	3	-	-	-		
CO5	3	3	2	2	3	-	-	-	3	1	-	-		
CO (Avg)	3	3	2	2	3	-	-	-	3	1	-	-		

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FUNDAMENTALS OF ALGORITHMS	9
Notion of an Algorithm - Fundamentals of Algorithmic Solving - Important Problem types - Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework - Asymptotic Notations and its properties - Mathematical Analysis for Recursive and Non Recursive algorithms		
UNIT II	**LINEAR DATA STRUCTURES – LIST,STACK,QUEUE**	**9**
List ADT – Operations (Insertion, Deletion, Merge, Traversal) - Array based implementation - Linked list implementation : singly , doubly-linked list - Applications of list : Polynomial Manipulation Stack ADT: Operations on Stack - Array Implementation - Linked List implementation - Application of Stack: Expression Conversion and evaluation. Queue ADT : Operations on Queue - Array Implementation - Linked List Implementation - Circular Queue- Priority Queue - Applications of Queue.		
UNIT III	**TREE STRUCTURES**	**9**
Tree ADT : Basic Tree Terminologies - Binary Tree - Expression Tree - Tree Traversal - Binary Search Tree: Construction, Searching, Insertion, Deletion, AVL trees: Rotation, Insertion, Deletion - Applications of Tree.		
UNIT IV	**GRAPH ALGORITHMS**	**9**
Basic Terminologies - Representation of Graph - Topological sort - Graph Traversal: Breadth first search - Depth first search - Biconnectivity - Shortest path algorithm: Unweighted Shortest Path - Dijkstra's algorithm - Minimum Spanning Tree : Prim's algorithm - Kruskal's Algorithm.		
UNIT V	**SORTING, SEARCHING AND HASHING TECHNIQUES**	**9**
Sorting: Insertion sort - Selection sort - Shell sort - Bubble sort - Heap sort - Quick sort - Merge sort. Searching: Linear search - Binary Search - Hashing: Hash Function - Separate Chaining - Open Addressing - Rehashing - Extendible Hashing.		

Text Book (s)

1	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, Latest Edition.

Reference (s)

1	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, The MIT Press, 2009.
2	ReemaThareja, "Data Structures Using C", Oxford University Press, 2011

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18CSO002J	FUNDAMENTALS OF PYTHON PROGRAMMING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basic constructs of Python programming.
2	Learn simple python programs using Control Flow, Functions and String concepts.
3	Learn various operations under different concepts in Collections to solve real time problems.
4	Acquire knowledge about Files, Modules and Packages.
5	Learn Object Oriented Concepts in Python.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the basic constructs of Python programming.
CO2	Demonstrate simple problems using Control Flow, Functions and String concepts.
CO3	Solve real time problems using various concepts in Collections.
CO4	Explain the concepts in Files, Modules and Packages.
CO5	Implement OOPs concepts.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	-	-	1	-	1	-	1		
CO2	3	2	2	1	2	-	-	1	-	1	-	1		
CO3	3	2	2	1	2	-	-	1	-	1	-	1		
CO4	3	2	2	1	2	-	-	1	-	1	-	1		
CO5	3	2	2	1	2	-	-	1	-	1	-	1		
CO (Avg)	3	2	2	1	2	-	-	1	-	1	-	1		

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	DATA, EXPRESSIONS AND STATEMENTS	6

Python Interpreter and Interactive mode - Values and Types: int, float, boolean, string, and list – Variables - Expressions - Statements - Tuple assignment - Precedence of Operators - Comments - Modules and Functions: function definition and use, flow of execution, parameters and arguments. Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT II	CONTROL FLOW, FUNCTIONS AND STRING	6

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else) - Iteration: state, while, for, break, continue, pass - Fruitful functions: return values, parameters, local and global scope, function composition, recursion - Strings: string slices, immutability, string functions and methods, string module - Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum of array of numbers, linear search, binary search.

UNIT III	COLLECTIONS	6

Lists: list operations, list slices, list methods, list loop, mutability, And aliasing, cloning lists, list parameters - Tuples: tuple assignment, tuple as return value - Dictionaries: operations and methods - Advanced list processing - List comprehension - Set: operations and methods. Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT IV	FILES, MODULES AND PACKAGES	6

Files and exception: Text files, Reading and Writing files, Format operator - Command line arguments - Errors and Exceptions: Handling exceptions - Modules - Packages.

UNIT V	OOPs CONCEPTS	6

Object Oriented Programming - Classes and objects, methods, Constructors - Inheritance: subclasses and Overloading, Overriding Methods - Data Encapsulation - Polymorphism.

LIST OF EXPERIMENTS	15

1. Programs using Input and Output
2. Programs using Looping and Functions
3. Programs using Strings
4. Programs using List
5. Programs using Set
6. Programs using Dictionary
7. Programs using Tuple
8. Programs using Files
9. Programs using Class and Objects
10. Programs using Inheritance

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Text Book (s)	
1	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2	Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
Reference (s)	
1	Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
2	Mark Lutz ,"Learning Python", O Reily, 4thEdition, 2009, ISBN: 978-0-596-15806-4.
3	Mark Lutz ,"Programming Python ", O Reily, 4thEdition, 2010, ISBN 9780596158118.
4	Tim Hall and J-P Stacey ,"Python 3 for Absolute Beginners" , 2009, ISBN:9781430216322.
5	Magnus Lie Hetland , "Beginning Python: From Novice to Professional", 2nd Edition, 2009, ISBN:9781590599822.

Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18CSO003J	FUNDAMENTALS OF JAVA PROGRAMMING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the fundamentals of object oriented programming in Java.
2	Learn the concepts of Array, String handling and Polymorphism.
3	Study the basics of Generics and Collections.
4	Establish a firm foundation on core Java concepts like Exceptions and Concurrent programming.
5	Develop Graphical User Interface using Event Driven Programming.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the concepts of Object Oriented programming.
CO2	Construct the programs with inheritance, Packages and String handling mechanisms.
CO3	Utilize the different Collections and type wrappers to solve logical building problems.
CO4	Make use of Exception handling mechanisms and Multithreading to solve real time problems.
CO5	Develop simple applications using Event handling.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	2	-	-	1	2	2	1	2		
CO2	3	2	1	-	2	-	-	1	2	2	1	2		
CO3	3	2	1	-	2	-	-	1	2	2	1	2		
CO4	3	2	1	-	2	-	-	1	2	2	1	2		
CO5	3	3	1	-	2	-	-	1	2	2	1	2		
CO (Avg)	3	2.20	1	-	2	-	-	1	2	2	1	2		

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	6
OOP Concepts - Introduction to Java - JVM - Data types - Variables - Operators - Control statements - Classes and Method - Instances and Initialization - Arrays - Constructors and Destructors - Garbage collection.		
UNIT II	**INHERITANCE AND PACKAGES**	**6**
Inheritance - Access Specifiers - Interfaces - Default interface method - Polymorphism - this Pointer - String Handling.		
UNIT III	**MAPREDUCE FRAMEWORK AND PIG**	**6**
Type Wrappers - Autoboxing - Generic classes - Generic methods - Generic interfaces - Collections - Lists - Sets - Maps.		
UNIT IV	**EXCEPTION HANDLING AND MULTITHREADING**	**6**
Exception handling - Exception hierarchy - Throwing and Catching exceptions - Throws - Finally - Built in Exceptions - User defined Exceptions - Multithreaded programming - Interrupting threads - Thread states - Thread priorities - Thread synchronization.		
UNIT V	**EVENT HANDLING**	**6**
Applet class - Basics of event handling - Delegation event model - Event classes - Event listener interfaces - Adapter classes - AWT.		
	LIST OF EXPERIMENTS	**15**

1. Simple Java program with Classes and Instances
2. Programs using inheritance and Dynamic Polymorphism
3. Programs using Interface
4. Programs using String handling
5. Programs using Type Wrappers
6. Programs using Generics
7. Programs using Collection Classes
8. Programs using Exception Handling
9. Programs using Multithreading
10. Programs using AWT

Text Book (s)

1	Herbert Schildt, "Java the Complete Reference", Ninth edition, McGraw-Hill Osborne Media, 2014.
2	P.J.Deitel and H.M.Deitel, "JAVA™ HOW TO PROGRAM", nineth edition, Pearson International Edition, 2011.

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Reference (s)	
1	Timothy Budd, —An Introduction to Object-Oriented Programming, Third Edition, Pearson Education, 2008.
2	K. Arnold and J. Gosling, "The JAVA programming language", Fourth edition, Pearson Education, 2005.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18CSO004J	MOBILE APPLICATION DEVELOPMENT	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand system requirements for Mobile Applications.
2	Generate suitable design using specific Mobile Development Frameworks.
3	Generate Mobile Application Design.
4	Implement the design using specific Mobile Development Frameworks.
5	Deploy the Mobile Applications in Marketplace for distribution.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the requirements for Mobile Applications.
CO2	Explain the challenges in Mobile Application design and development.
CO3	Develop design for Mobile Applications for specific requirements.
CO4	Implement the design using Android SDK.
CO5	Implement the design using Objective C and iOS.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	-	2	2	1	-	1		
CO2	3	2	2	2	2	-	-	2	2	1	-	1		
CO3	2	2	2	2	2	-	-	2	2	1	-	1		
CO4	3	2	2	2	2	-	-	2	2	1	-	1		
CO5	2	2	2	2	2	-	-	2	2	1	-	1		
CO (Avg)	2.60	2	2	2	2	-	-	2	2	1	-	1		

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	6
Introduction to Mobile Applications - Embedded systems - Market and Business drivers for Mobile Applications. Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application.		
UNIT II	**BASIC DESIGN**	**6**
Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.		
UNIT III	**ADVANCED DESIGN**	**6**
Designing applications with Multimedia and Web access capabilities – Integration with GPS and Social Media Networking Applications – Accessing applications hosted in a Cloud Computing Environment.		
UNIT IV	**TECHNOLOGY I - ANDROID**	**6**
Android architecture – Activities and Views –Persisting data using SQLite – Using Google Maps, GPS and Wifi – Integration with Social Media Applications.		
UNIT V	**TECHNOLOGY II - iOS**	**6**
Introduction to Objective C – iOS features – UI implementation – Touch Frameworks – Data Persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit.		

LIST OF EXPERIMENTS	15

1. To study about android platform and project structure.
2. To develop a simple android application using Relative layout to display toaster message.
3. To develop an application that uses GUI Components, Fonts and Colors.
4. To develop an android application that makes use of SQLite database.
5. To develop a native application that uses GPS location information.
6. To develop an android application with the support of activity lifecycle.
7. To develop an application to create a simple user interface for parsing the XML file using linear layout.
8. To develop an applications with multiple activities and a simple menu using List View.
9. To develop an android application to implement Fragment.
10. To develop an android application to implement Media and Camera API.
11. To create an application to implement Sensor programming in android studio.

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Text Book (s)	
1	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013.
2	Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.
Reference (s)	
1	Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012.
2	James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012.
3	http://developer.android.com/develop/index.html.

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Regulation 2018		-	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18CSO005T	SOFTWARE DEVELOPMENT USING AGILE	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basic concepts of Agile based Software Development.
2	Gain knowledge in the area of various Agile Methodologies.
3	Gain knowledge in Agile Testing.
4	Understand the benefits and pitfalls of working in an agile team.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the fundamentals of SDLC Models and Agile Software Development.
CO2	Understand the concepts of Agile Scrum Framework.
CO3	Explain various Agile Testing Methods and its Process.
CO4	Understand the techniques and tools for improving Team Collaboration and Software Quality.
CO5	Discuss the Metrics and Quality Assurance in Agile Software Development.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	1	-	1	1	-	2	2	1	2	2	2
CO2	3	2	2	2	2	1	-	1	-	-	2	2	2	2
CO3	3	2	1	1	2	1	1	-	-	-	-	2	2	2
CO4	2	-	-	1	-	-	1	-	1	1	-	1	2	2
CO5	2	-	1	1	-	-	-	-	1	1	-	1	2	2
CO (Avg)	2.60	2	1.33	1.20	2	1	1	1	1.33	1.33	1.5	1.60	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	FUNDAMENTALS OF AGILE	9
Software Development Models – Comparison between Agile and Generic Models - Genesis of Agile - Introduction and background - Traditional Model vs. Agile Model - Classification of Agile Methods - Agile Manifesto and Principles - Overview of Scrum - Agile Project management - Design and development practices in Agile Projects - Test Driven Development - Continuous Integration - Refactoring - Pair Programming - Simple Design - User Stories.		
UNIT II	**AGILE PROCESSES**	**9**
Lean Production - SCRUM, Crystal, Feature Driven Development - Adaptive Software Development - Extreme Programming: Method Overview - Lifecycle - Work Products, Roles and Practices.		
UNIT III	**AGILE TESTING**	**9**
The Agile lifecycle and its impact on testing - Test-Driven Development (TDD) - xUnit framework and tools for TDD - Testing User Stories - Acceptance Tests and Scenarios - Planning and Managing testing cycle–Exploratory testing - Risk based testing - Regression tests - Test Automation - Tools to support the Agile tester.		
UNIT IV	**AGILITY AND REQUIREMENTS ENGINEERING**	**9**
Impact of Agile Processes in RE - Current Agile Practices - Variance - Overview of RE Using Agile - Managing Unstable Requirements - Requirements Elicitation - Agile Requirements Abstraction Model - Requirements Management in Agile Environment - Agile Requirements Prioritization - Agile Requirements Modelling and Generation - Concurrency in Agile Requirements Generation.		
UNIT V	**AGILITY AND QUALITY ASSURANCE**	**9**
Agile Product Development - Agile Metrics - Feature Driven Development (FDD) - Financial and Production Metrics in FDD - Agile Approach to Quality Assurance - Test Driven Development - Agile Approach in Global Software Development.		

Text Book (s)

1	Ken Schawber, Mike Beedle," Agile Software Development with Scrum", Pearson Edition 1, 2008.
2	Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley, 2008.
3	Robert C. Martin," Agile Software Development, Principles, Patterns and Practices", Pearson Edition 1, 2013.

Reference (s)

1	Richard Fairley, "Software Engineering Concepts" –, Tata Mcgraw Hill, 2008.
2	Alistair Cockburn, "Agile Software Development", Second Edition, Pearson Education Asia, 2006.

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX003L	REACT JS	0	0	2	1

Prerequisite Course (s)

HTML, CSS, JavaScript

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basics of react js applications.
2	Learn the different types of components.
3	Understand and practice different types of events

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Create and run real time applications using React JS.

CO-PO Mapping

Cos	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	-	-	1	3	-	-	2	3	3	-
CO (Avg)	3	2	3	2	3	-	-	1	3	-	-	2	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

TOPICS
Introduction to React Anatomy of react project Running the app Debugging first react app Templating using JSX Components-types-Architecture-composition Working with state and props Event handling in React Working with Forms Performing CRUD Operations in ReactJS Routing with React Router

Reference (s)

1	Robin Wieruch "The Road to Learn React: Your Journey to Master Plain Yet Pragmatic React. Js" ISBN:9781720043997, 172004399X

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX004L	STATISTICAL ANALYSIS USING R	0	0	2	1

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basic concepts of R Programming.
2	Learn various data types to solve the real time problems.
3	Know Decision Making, Looping Statements and Function to solve the real time problems.
4	Gain knowledge about various Charts & Graphs to give the statistical analysis of data.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basic concepts of R Programming.
CO2	Apply the various data types to solve the real time problems.
CO3	Make use of various Decision Making, Looping Statements and Function to solve the real time problems.
CO4	Apply the various Charts & Graphs to give the statistical analysis of data.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	1	3
CO2	3	3	2	2	-	-	-	-	-	-	-	-	2	2	3
CO3	3	3	2	2	1	-	-	-	-	--	-	-	3	3	3
CO4	3	3	2	2	1	-	-	-	-	-	-	-	3	3	3
CO (Avg)	**3**	**2.2**	**2**	**2**	**1**	-	-	-	-	-	-	-	**2.25**	**2.25**	**3**

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TOPICS
Introduction to R R Data types: Vectors Lists Arrays Factors Data Frames Decision Making and Looping Statements Function with Argument Function without Argument R Charts & Graphs

Reference (s)	
1	Dr.Sandip Rakshit, Statistics with R Programming, McGraw Education Private Ltd, India.

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX001L	ANIMATIONS	0	0	2	1

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Develop competencies and skills needed for becoming an effective Animator
2	Develop expertise in life-drawing and related techniques

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Produce an object after applying the required 2D/ 3D transformation techniques
CO2	Develop 2D / 3D animation for a given scenario by applying the principles of animation

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	-	1	-	-	1	2	1	-		3	2
CO2	3	3	2	-	1	-	-	-	-	-	-	-	3	2
CO (Avg)	3		1.5	-	1	-	-	1	2	1	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

TOPICS

Introduction to animation: Animation basics, File formats, File types Color Models, Principles of animation, Techniques of animation – Traditional animation, stop motion and computer, Introduction to 2D and 3D animation. 2D ANIMATION- Types of 2D Graphics, 2D graphics Techniques- Translation, Rotation, Scaling, Reflection and Shearing, 2D Animation Tools Introduction, Applications of 2D animation. 3D ANIMATION - Phases of 3D Graphics - Modeling, Animation and Rendering, 3D graphics Techniques-Translation, Rotation, Scaling, Reflection and Shearing.

Reference (s)

1.	Steve Roberts,Character Animation: 2D Skills for Better 3D",Second Edition, Focal Press, 2007.
2.	Rick Parent, „Computer Animation: Algorithms and Techniques", Third Edition, Elsevier, 2012

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX002L	PROBLEM SOVLING USING C++	0	0	2	1

Prerequisite Course (s)

PROGRAM FOR PROBLEM SOLVING

Course Objective (s):

The purpose of learning this course is to:

1	Identify and practice the object-oriented programming concepts and techniques
2	Practice the use of C++ classes and class libraries, modify existing C++ classes, develop C++ classes for simple applications.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the difference between object oriented programming and procedural oriented language and control structures in C++.
CO2	Explain the concept of C++ features such as Function Overloading, Friend Function, Inline Function, Inheritance, Constrctors etc.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	2	2	-		3	2
CO2	3	3	2	-	-	-	-	-	2	2	-	-	3	2
CO (Avg)	3	3	2.5	-	-	-	-	-	2	2	-	-	3	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

TOPICS

Procedural Vs. Object-Oriented Programming -Basic Concepts and Principles of OOP - Applications of OOP. Overview of C++ - Program Structure - Preprocessor Directives - Operators in C++ - Control Structures.Functions – Function Overloading - Inline Functions - String Library Functions - Friend Functions . Basics of Object and Class in C++ - Private and Public Members- Constructors - Types – Destructors. Inheritance - Protected Members - Types of Inheritance.

Reference (s)

1.	E.Balagurusamy, Object Oriented Programming with C++, TATA Mc GRAW HILL EDITION, Third Edition.
2.	Ira Pohl, Object-Oriented Programming using C++, 2nd ed., Pearson Education, 1997.

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX007L	MongoDB	0	0	2	1

Prerequisite Course (s)

Database Management Systems

Course Objective (s):

The purpose of learning this course is to:

1	Understand the fundamental concepts of MongoDB
2	Learn various operations of MongoDB.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain MongoDB and their various Operations.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	-	-	1	2	2	-	1	3	2
CO (Avg)	3	3	2	2	1	-	-	1	2	2	-	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

TOPICS

NoSQL Database - MongoDB Introduction - Advantages over RDBMS - Atlas - Data Types – Operators- CRUD Operations – Indexing – Aggregation – Replication - Sort record – sharding - limit - Regular Expression - Text Search – ObjectId – Relationships - MongoDB Compass - BI connector - MongoDB - Java Cassandra vs MongoDB

Reference (s)

1	Shannon Bradshaw, Eoin Brazil and Kristina Chodorow, "MongoDB: The Definitive Guide 3e: Powerful and Scalable Data", O'REILLY, 2019.
2	MongoDB Applied Design Patterns: Practical Use Cases with the Leading NoSQL Database, O'REILLY, 2019.
3	https://university.mongodb.com/

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX006T	ETHICS IN CYBER SECURITY	1	0	0	1

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Learn the Ethics in Cyber Security

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the Ethics in Cyber Security

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	3	-	-	-	-	2	2
CO (Avg)	-	-	-	-	-	-	-	3	-	-	-	-	2	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

TOPICS

Important Ethical Issues In Cyber Security - Cybersecurity Resource Allocation - Cybersecurity Roles, Duties and Interests - Common Ethical Challenges for Cyber Security Professionals - Ethical Challenges In Balancing Security with other values - Ethical Challenges in Threat/Incident Response - Ethical Challenges in Security Breach/Vulnerability - Ethical Challenges in Network Monitoring and User Privacy - Ethical Challenges in Data Storage and Encryption - Ethical Challenges in IoT, Smart Grid and Product Design - Ethical Challenges with Accountability for Cybersecurity - Ethical Challenges in Security Research and Testing - Cyber Security Professionals' Obligations To The Public.

Reference (s)

1. Mary Manjikian, Cybersecurity Ethics , Routletge Publishers, First Edition.

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Regulation 2018		-	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18CSX005T	DATA CENTER AND CLOUD BASICS	1	0	0	1

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Learn the basics of CBO and Cloud Services.
2	Learn and Practice the features available in Office 365.
3	Know the basic operations of Data Center.
4	Learn the working of SCCM.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basics of CBO and Cloud Services.
CO2	Make use of the features available in Office 365.
CO3	Discuss the basic operations of Data Center.
CO4	Understand the working of SCCM.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	1
CO1	3	3	2	2	-	-	-	-	-	-	-	-	2	2
CO2	3	3	2	2	1	-	-	-	-	--	-	-	3	3
CO3	3	3	2	2	1	-	-	-	-	-	-	-	3	3
CO4	**3**	**2.2**	**2**	**2**	**1**	-	-	-	-	-	-	-	**2.25**	**2.25**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

TOPICS

CBO Overview

- Services/Functions, Offerings, Technology stack, Japan centric Delivery

Cloud Computing

- Cloud Overview, Private/Public/Hybrid IaS/PaS/SaS Service Providers Cloud computing Services

DevOps Overview

- Dev ops model, Continuous Integration, Continuous Delivery, Process and Tools, Micro

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services

Office 365 Overview

- Office 365 Basics, Different Services in Office 365, Office 365 tools, Office 365 Setup/Configuration, Active Directory Federation Services (ADFS)

Datacenter Operations Overview

- Datacenter Components, Datacenter Operations support, Hybrid cloud Management, IT Service Management.

Networking Paradigm

- Network Devices, Data/voice network services, LAN/WAN Basics, Firewall Overview

Windows 10 - End User Computing Basics

- Windows 10 Operating System, Antivirus Management, Patches Management, Devices Configuration

Windows SCCM - Operations Manager Overview

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